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THE IRON TRADE REVIEW

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Improvement Not Sustained

In February as compared with January—Finished material prices are shaded

The improvement made in January did not continue at the same rate during February, which was somewhat disappointing. The very cold weather of the past month has had a tendency to check many operations, and another factor in giving a less favorable ascept to the situation is the failure to maintain some prices in finished materials which have been announced. The recent talk about charging 1.25c, Pittsburgh, for shapes, plates and bars for this month and 1.30c for the second quarter is not taken seriously, but buyers who have contracts providing for a 1.20c price for the first quarter and 1.25c for the second quarter are being urged to specify before April 1 and are being notified that unspecified tonnages on April 1 will be cancelled.

Plates and Shapes

It is understood that the Carnegie Steel Co. will supply 50,000 tons of steel for the third-tracking of elevated lines in New York City. Structural contracts are being let very slowly, but heavy tonnages are pending and it is expected that when the weather moderates, there will be heavy contracting. Eastern plate mills are operating at about 80 per cent of capacity.

Pig Iron

The invading of the eastern market by 15,000 to 20,000 tons of Canadian pig iron marks the first importation of any considerable size under the new low tariff law. The iron has been purchased largely by cast iron pipe makers and is of foundry grade which will compete principally with southern irons. Pig iron is fairly active in the New York district. In the Philadelphia district, there has been some activity in basic and the Lukens Iron & Steel Co. has purchased 4,000 tons for March delivery. An inquiry for 7,000 tons of basic for prompt delivery is pending and a Harrisburg consumer is understood to have taken several thousand tons of southern basic. In central western territory, the pig iron market is very quiet, but prices are being maintained and some advances have been announced. In the Chicago territory, melters are showing more interest in last half iron.

Railroad Buying

Orders for about 8,000 cars were placed during February, a decrease of 5,000, as compared with January. Inquiries for about 10,000 cars are pending and it is expected that some orders will be placed soon. Rail orders for February amounted to about 185,000 tons. The recent order of the Baltimore & Ohio for spikes, placed with the Jones & Laughlin Steel Co., was for 30,000 kegs. The Southern railroad, which has been considering the advisability of buying 5,000 tons of steel for cars, will not do so, but will purchase cars.

Iron and Steel Bars

Competition in iron and steel bars continues very active and on reinforcing bars some mills are not asking any extra charge for twisting. There is an increasing tendency to disregard the Pittsburgh base on steel bars, as has long been done on iron bars. The iron mills in the Cleveland district are operating at only about 50 per cent of capacity.

Scrap

The scrap market in nearly all parts of the country is either lifeless or tending downward. Consumers in the Pittsburgh district who bought liberally some time ago are showing no interest.

THE OPEN HEARTH

One year of the Wilson administration---What has been its effect on business?---Two radically different views

THE IRON TRADE REVIEW *publishes the following views concerning the Wilson administration as illustrating the conflicting opinions of business men and not as expressing its own. Doubtless there is much truth in both of these columns as well as much that is not true. Perusal of the two may assist in forming a just judgment.*

A Friendly View

PRESIDENT WILSON, a few evenings since, at a banquet of political opponents, in New York, was toasted as "a man of surpassing individual attainment". This is indeed a tribute to one who until a few years ago was known only as a college professor, writer and theorist. Countless numbers of his countrymen a year ago feared that he would prove to be visionary in theories and incapable of accomplishing anything of importance. Today the former professor is credited by all fair-minded men with having shown amazing ability in molding legislation and getting results of the highest importance. Surely to have such an example of efficiency at the head of the government is of incalculable value to all business interests.

The new tariff law, while far from perfect, has the one great virtue, at least, of putting manufacturers upon their mettle, so that now, as never before, they are striving to abolish wasteful methods. They are getting away from the idea of being infants. The full grown, manly industries of the country will fight for their share of the commerce of the world and will have a triumphant victory.

The new currency law, sweeping aside the archaic methods which have been so long in vogue, freeing the country from the domination of New York in the banking of the country and bringing about other important reforms, will be a tremendous power for good, not only in reducing the likelihood of panics, but in enabling manufacturers more easily to carry on legitimate business operations.

Ex-President Taft, in the current issue of the *Saturday Evening Post,* says: "Never before, in its recent history certainly, has the Democratic party exercised such self-control. It is due to circumstances and to Mr. Wilson's masterful personality and attitude. First, he knows what he wishes; and second, he is determined to get it, and his party associates are convinced of both facts. * * * * * The people, or at least the rank and file of his party, sympathize with the president. They are pleased with his success in putting his measures through."

If the president's political opponents appreciate his "surpassing individual attainments" and his "masterful personality", why should not the business men of the country?

An Antagonistic View

THE one-year-old Wilson administration should be judged not only by the disastrous results which it has already caused to the business interests of the country, but also by its plans and policies, which, if carried out, will result in depression far greater than has yet been experienced.

The tariff law, illogical and unjust in almost every particular, is already result-

ing in serious competition for American iron and steel manufacturers. Canadian pig iron is being purchased by eastern melters, German steel bar makers are selling their product in this country, Indian pig iron will doubtless be shipped to our shores and throughout the country American workingmen will feel the effects of foreign competition, causing idleness and lower wages.

The labor trust, headed by Gompers, is in full command at the capital of the nation. Never before in the history of the country has there been such subservience to agitators who for years have demanded vicious legislation.

The administration's anti-trust bills, known as "the five brothers", contain some provisions which would be disastrous in a high degree to the business interests of the country. For example, the interstate trade commission bill provides for indiscriminate publicity as to the financial condition, conduct, management and affairs of all important companies.

Although pretending to not desire to antagonize any legitimate business, President Wilson is encouraging those who are pushing the anti-trust bills, just as in the past, after promising that business interests would be carefully guarded, he urged through congress the tariff bill with its unjust and annoying income tax and countless other unwise features. His policies of the past have greatly hampered business; his plans for the future constitute an even greater menace.

The Fight Against Whisky

SEVERAL events recently have called attention to the attitude of manufacturers concerning the use of liquor by their employes. Newspapers published in Pittsburgh and in mill towns within a radius of 50 miles from that center have published numerous accounts of liquor being put under the ban by owners of steel mills. Some of the accounts are exaggerated, while others are fairly accurate. Considerable excitement has recently been aroused in Pittsburgh by the sensational campaign of Billy Sunday, the evangelist, against sin in general and whiskey drinking in particular. Steel company presidents, superintendents, foremen, day laborers—almost the entire population of the district, in fact—heard the evangelist, and whether they went through motives of curiosity or otherwise, and whether they "hit the sawdust trail" or not, many have quietly been using their influence in the cause of temperance. Likewise at Youngstown, where a local option campaign ended Monday in a victory for the wet element, by a majority of 252, compared with a wet majority of 1,931 in 1909, the influence of the manufacturers and their employes was thrown largely against the saloons.

The fact is that there is a tremendous and rapidly increasing sentiment in this country against the liquor traffic and manufacturers are falling into line and doing their share in the battle for better conditions.

Prices, Present and Past

UNDER the above caption, THE IRON TRADE REVIEW today begins publishing a new table showing prices of important iron and steel products at leading centers, not only for the present date, but also the averages for the past month, three months ago and March, of last year. It has long been our custom to publish tables of prices giving a range, in recognition of the fact that it never can be said that all transactions at a certain date are made at one price. The tables giving a range of prices as in the past will be continued. There has been, however, an insistent demand for a table of prices of leading products in which a definite single price should be given in the case of each product. This demand has been due to the fact that it is necessary to have definite prices in making sliding scale contracts. In quoting a single price, the rule will be to name the price which governs the largest percentage of the known transactions for the date stated.

In giving average prices for the past, we have acted on the belief that the monthly average of prices more nearly than those for a single week or a single day reflects market conditions.

Prices Present and Past

Quotations on leading products today, average for last month, average for month of December last and average for March, 1913. Prices are those ruling in the largest percentage of sales at the dates named.

	Today's prices.	Average for Feb., 1914.	Average for Dec., 1913.	Average for March, 1913.
Bessemer pig iron, Pittsburgh..	$15.15	$15.09	$15.90	$18.15
Basic pig iron, Pittsburgh.....	14.15	14.09	13.71	17.03
No. 2 Fdy. pig iron, Pittsburgh	14.15	14.09	14.36	17.65
Northern No. 2 fdy. Chicago...	14.25	14.25	14.50	17.50
Ferro manganese, Baltimore....	38.00	38.75	46.50	64.25
Lake Superior char., Chicago..	15.50	15.50	15.50	18.00
Southern No. 2, Birmingham...	10.75	10.75	10.75	13.00
Southern Ohio No. 2, Ironton..	13.00	13.00	13.50	16.00
Basic, eastern Pa.....	14.25	14.15	14.00	17.50
No. 2X Virginia furnace.....	12.75	12.75	12.75	15.50
No. 2X Foundry, Philadelphia.	15.00	14.75	15.00	17.75
Bessemer billets, Pbgh. and Ygn.	21.00	21.00	20.00	29.00
Open hearth billets, Pbgh. & Yn.	21.00	20.75	20.00	29.50
Bess. sheet bars, Pbgh. and Yn.	22.00	22.00	21.00	29.50
Op. h'th sh. bars, Pbgh. & Yn.	22.00	21.75	21.00	30.00
Iron bars, Cleveland.....	1.25	1.25	1.30	1.65
Steel bars, Pittsburgh.....	1.20	1.20	1.21	1.40
Iron bars, Philadelphia.....	1.32½	1.27½	1.27½	1.67½

	Today's prices.	Average for Feb., 1914.	Average for Dec., 1913.	Average for March, 1913.
Beams, Pittsburgh	$ 1.25	$ 1.20	$ 1.25	$ 1.45
Bar iron, Chicago mill.....	1.20	1.20	1.15	1.60
Tank plates, Pittsburgh.....	1.20	1.20	1.18	1.45
Sheets, blk., No. 28, Pittsburgh	1.95	1.94	1.88	2.35
Sheets, blue ann., No. 10, Pitts.	1.40	1.40	1.40	1.75
Sheets, galv., No. 28, Pitts....	2.95	2.94	2.87	3.50
Wire nails, Pittsburgh.....	1.60	1.59	1.55	1.75
Connellsville fur. coke, contr...	2.00	1.92	1.81	2.50
Connellsville fdy. coke, contr...	2.50	2.50	2.54	3.50
Heavy melting steel, Pittsburgh	12.25	12.37	11.00	14.25
Heavy melting steel, eastern Pa.	11.50	11.00	10.00	13.50
Heavy melting steel, Chicago...	10.50	10.50	9.00	12.50
Heavy cast, eastern Pa.....	13.00	13.00	12.50	14.00
No. 1 wrought, eastern Pa.....	15.00	14.50	13.00	15.50
Car wheels, Chicago.....	12.25	12.25	11.75	17.25
No. 1 wrought, Chicago.....	9.75	9.85	8.50	12.00
Rerolling rails, Chicago.....	11.75	11.00	11.50	15.00

(For Additional Prices See Page 486.)

Pittsburgh Disappointed

By showing of last month—New buying has declined —More mill activity

Office of The Iron Trade Review,
2148-49 Oliver Bldg.,
Pittsburgh, March 3.

February did not come up to expectations in many respects; new buying, which featured the market the initial month of the year, failed to continue at a satisfactory rate after Feb. 10, while prices of heavier products, although slightly stronger, have not yet fully responded to advances announced by leading manufacturers, and irregularity still characterizes the market in most section of the country. Outdoor work the last fortnight has been almost out of the question, on account of the weather, and many transactions have been deferred by blizzards and snow storms. On the other hand, specifications have not fallen off to any great extent, and mill operations, in some instances, have been increased, but no further improvement is expected until the opening of spring.

Pig Iron

Pig iron buying has been light, and there has been scarcely any inquiry. Consumers have covered needs through the first half, and show no interest in the market after July 1. Foundry and malleable have commanded $13.50, valley, the last 10 days, and dealers regard that figure as the bottom of the market. Steel making grades, February averages of which are given elsewhere in this issue, are quiet.

Ferro-Alloys

Reference to irregularity in the opening paragraph applies to ferromanganese, but not entirely. Dealers are asking $40, seaboard, but German grades have sold as low as $38, seaboard, and material still is offered at that figure for nearby shipment, subject to cable confirmation. Other alloys, although quiet, are unchanged.

Sheets and Tin Plate

February was a heavy month in the sheet market, far better than the average February; some mills practically equalled tonnage records for that month. Despite demand, makers have not formally opened books for second quarter. Sheet and tin plate mills are operating at about 80 per cent.

Rails and Track Material

Rail specifications last month exceeded those of January by a broad margin, but January, it will be recalled, was a decidedly light month. Standard spikes are being held at 1.45c. Track bolts are unchanged.

Plates and Shapes

Although some manufacturers advanced products to 1.25c for first quarter and 1.30c for second quarter shipment, those figures have not been well established, as prompt material continues to be obtained at 1.20c, and rumors of plates selling at 1.15c are heard. The lack of car buying has seriously affected this department, but better inquiry for cars has come out the last two weeks.

Semi-Finished

Billets and sheet bars are obtainable at $21 and $22, respectively, at Youngstown, but it is believed Pittsburgh consumers would have to pay $1 a ton above those figures. Forging billets are commanding $26, Pittsburgh—$1 a ton above the previous maximum price. Muck bar and wire rods are quiet.

Bolts, Nuts and Rivets

Specifications have been heavier, but prices are irregular, and it is impossible to offer representative figures. Plants have increased operations slightly.

Bars, Hoops, Bands and Shafting

Irregularity in steel bars is reported at some centers. Material is obtainable at 1.20c without difficulty. Iron bars are selling at 1.30c and 1.35c. Hoops and bands are quiet. Shafting shows better tone, as the result of increased specifications, but prices have not improved.

Tubular Goods

Mills are operating almost full, and prices are slightly better. Several inquiries for steel pipe are pending;

(*For Complete Prices see page* 486)

they have been previously mentioned. Boiler tube demand has not improved.

Wire Products

Cold, stormy weather is largely responsible for a decrease in specifications for wire products. February, as a whole, was a satisfactory month, but demand the last week or 10 days has been light. Prices, although firmly held, have not been fully established.

Coke

The Maryland Steel Co. has covered March coke requirements for furnaces at Sparrows Point, Md., having taken 10,000 at $2, ovens, from one shipper, and it is understood another operator was awarded a similar tonnage. Spot furnace coke has been stronger, most dealers being able to obtain $2, ovens, without difficulty. Foundry grades are being held at $2.75, ovens, by leading sellers. About 20,000 tons of Oliver Iron & Steel Co. coke, usually consumed by the Corporation, was sold for March shipment. The Connellsville Courier, for the week ending Feb. 21, says production was 303,160 tons, an increase of 2,910 tons compared with the week before.

Old Material

The scrap market, after registering a decline last week, has failed to show any improvement. Consumers are well covered, and show no interest in material being offered. No change in the situation is expected until finished lines become stronger.

Better Outlook at Chicago

Heavier specifications for finished materials—Increased orders for cast iron pipe

Office of THE IRON TRADE REVIEW,
Chicago, March 3.
1521-23 Lytton Bldg.,

Increased specifications for finished steel products, beginning late last week and continuing in the beginning of this week, feature the market in this district. After a comparative lull, the latter part of February, March opens with a much better outlook for tonnage and mill owners believe the month will show largely increased operations.

Contracts and specifications in February were at about the same rate as January, but as it was a shorter month, the total tonnage may be somewhat less. Some mills are operating at about 80 per cent of capacity compared with 50 per cent or less in December. One interest states that specifications for finished steel products are coming in better than at any time since last fall.

Agricultural implement buyers have begun to feel the market and it is believed these buyers will be active in the market within a comparatively short time.

Anxious About Last Half Iron

Melters seem to be growing somewhat more anxious as to last half requirements and inquiries for considerable tonnage are being received. Southern makers refuse to accept business beyond the middle of the year, except one producer, who will quote for third quarter delivery. Northern makers continue to ask 75c to $1 advance after July 1, but do not desire to contract that far ahead. Ironton furnace interests ask $1 more than present prices for last half.

A Wellston furnace has announced an advance of 50c per ton on No. 2 foundry, to $13.50, Ironton, but other furnaces in that district are selling at $13.

Southern iron in the Chicago district is selling at $11, Birmingham, for No. 2 foundry, and northern iron continues to be quoted at $14.25, Chicago furnace.

While no large sales are being made the market is characterized by inquiries and sales of small tonnages, scattered over wide territory. Melters are not deferring shipments and on the contrary in many cases are asking them ahead of contract time.

Three inquiries for approximately 1,000 tons each for northern and southern iron through last half are pending.

The situation in the bar market, both iron and steel, is much the same as for the past fortnight, mills having a comfortable tonnage on the books and specifications keeping up well.

Plates are Firmer

Plates, which have been somewhat weak, seem to be gaining strength, and while they are still quoted at 1.38c to 1.43c, Chicago, the minimum quotation is heard less frequently and a greater tonnage is being sold at the maximum. Some increase in car orders has helped the plate market materially.

Structurals also are improving and the quotation, 1.43c, Pittsburgh, is firm. Some tonnage for delivery through second half has been sold at this price.

Sheet Delivery Slower

Sheet mills in this district are receiving specifications at such a rate that delivery is becoming somewhat deferred, in marked contrast with conditions that have prevailed. While 2c and 3c, respectively, for No. 28 black and galvanized sheets, still are being obtained, concessions of $1 a ton are being made on attractive business.

Cast Pipe Prospects Good

Business in cast iron pipe is more in prospect than present reality. The Massillon Iron & Steel Co. has taken 300 tons at Elyria, O., and 160 tons at Saginaw, Mich. The latter contract carries 300 tons additional, which is provisional. The United States Cast Iron Pipe & Foundry Co. is low bidder on 600 tons at Dayton, O., which has not been awarded. Fort Wayne, Ind., opened bids, March 3, on 300 tons. Battle Creek, Mich., will award from 200 to 450 tons, March 9, and Detroit is to open bids, March 10, for 10,000 tons.

Scrap Up to Consumers

After a meteoric rise through January and considerable fall in February, the scrap market is almost standing still at present. It is essentially a consumers' market, with most mills and large users in possession of their usual stock and reserve and dealers also holding considerable tonnage. The latter have been feeling out the market cautiously the last few days, but for the most part have been unable to dispose of their holdings. The Chicago & North-Western offers 6,000 tons, including 1,000 tons of steel rails, 750 tons of No. 1 railroad wrought and 500 tons of No. 1 cast. The Wabash offers 1,200 tons, one-third of which is steel rails.

(For Complete Prices see page 486)

Doesn't Like It

An attack on the Illinois workmen's compensation law was made by Duncan McDonald, secretary-treasurer of the United Mine Workers of America, District No. 12, at the opening session of its convention at Peoria. In his report to the convention Mr. McDonald says:

"The Illinois compensation law is a poor excuse for a makeshift as compared with the laws in force in Ohio and Washington."

The National Aluminum Works, Wellsville, N. Y., has decided to rebuild its plant recently damaged by fire.

Ohio Furnaces Advancing

Higher prices announced at Cincinnati—Market is quiet

Office of THE IRON TRADE REVIEW,
Cincinnati, March 3.
503 Mercantile Library Bldg.,

Two southern Ohio furnaces, Wellston, at Wellston, O., and Hanging Rock, at Hanging Rock, O., have advanced prices on No. 2 foundry iron to $13.50, Ironton, for the second quarter. Both are fairly well sold up for this period and do not care to take any more business at present figures. This leaves only one producer in the Ironton district willing to sell at $13, Ironton, for the rest of the first half.

A large Marion, Ind., interest has closed for 1,500 tons of northern, and 1,500 tons of southern foundry iron, and 700 tons of silvery iron for deliveries extending from next April through to December. This company is still in the market for 3,000 tons of northern and southern iron, which will be purchased if certain contracts are secured. A Detroit user has taken 1,000 tons of silvery iron for the second and third quarters, and a sale of 1,500 tons of northern iron is reported to have been made to a southern Ohio user for second quarter delivery.

The minimum price for southern No. 2 foundry iron is now $10.75, Birmingham basis, for second quarter shipment. Some Dayton, Tenn., warrant iron is obtainable at $10.50, Birmingham basis, for prompt shipment, but it is limited as to grades and is uncertain in analysis. The majority of furnaces are firm at $11, Birmingham, for the second quarter, and considerable business has been booked at this figure recently. The market during the past week has been quiet, but has not grown any weaker.

Coke

Requisitions to forward shipments on contracts are heavier than at any time during the past seven months, and have gradually increased during the past three weeks. Very little new business is being booked, present orders being mostly for small lots of foundry coke. Prices are unchanged in all of the districts and are fairly strong, especially in the Pocahontas and New River fields.

Finished Materials

The sheet marked is much stronger than that of any of the other finished materials. Business on sheets during the past month exceeded that of February, 1913, in actual specifications booked by over 25 per cent. The American Rolling Mill Co., Middletown, O., booked more orders during the week of Feb. 16 than in any similar period since its organization. This company has a capacity of 150,000 tons of sheets a year or about 3,000 tons per week, and the tonnage booked from Feb. 16 to Feb. 21 was 3,600 tons, which is almost 600 tons more than its capacity. The principal reason for this buying movement is that stocks have been allowed to run low and with another advance in prices in sight, users and dealers are beginning to cover for their requirements. Blue annealed sheets No. 10 are quoted at 1.60c to 1.65c, Cincinnati, black sheets No. 28 gage at from 2.15c to 2.20c, Cincinnati, and galvanized No. 28 gage at from 3.15c to 3.20c, Cincinnati.

Warehouse business is being seriously handicapped by present bad weather and as a result it is almost at a standstill. Inquiries indicate that much better business will be realized when the weather clears.

Old Material

The market is very quiet and prices are a little weaker. The present weather has seriously handicapped deliveries. Local foundries are buying very sparingly and the demand from outside of the city has fallen off considerably. A sale of bundled sheet scrap to a nearby melter is reported by a local dealer at $5.45 per net ton, f. o. b. dealers' yards.

Cleveland Market is Quiet

But pig iron sellers are adhering to the higher price schedule

Office of THE IRON TRADE REVIEW,
Penton Bldg.,
Cleveland, March 3.

Pig iron sellers generally are adhering to the higher prices recently announced. For this reason, and also because consumers are still covering for the first half of the year, the market at present is extremely dull, although some sellers report fair inquiry. The most encouraging feature is that pig iron is going forward on contracts without any requests for deferment of shipments being made and it is evident that the melt is in good volume.

There is as yet no talk of ore for 1914 delivery. The situation is unusual, but it apparently meets the approval of both sales agents and furnace interests. The weather was against the transfer of ore from Lake Erie docks to furnace yards during February and the movement was accordingly slow.

Finished Material

Specifications are being received in fair volume, but new business is very light. Mills are showing a disposition to adhere strictly to contracts in which it is provided that a charge $1 higher shall be made for delivery in the second quarter than in the first. Consumers having contracts to this effect are being reminded that unspecified tonnage will be cancelled. Reports of higher prices being asked by some of the leading consumers are not taken seriously, as it is conceded that the sellers are having all they can do to maintain present schedules. On sheets, prices are being adhered to remarkably well considering the very small volume of business being transacted. On reinforcing bars, some mills are not charging extra for twisting and on 600 tons for a Cleveland factory building it is understood that a price of 1.20c, Pittsburgh, with no charge for twisting, was made. This is equivalent to 1.15c, Pittsburgh, on untwisted bars. Bar iron is very dull and mills are operating at about 50 per cent of capacity.

Old Materials

The scrap market has grown weaker in the past week, and prices of most grades have declined about 50 cents a ton. Most consuming mills not only are placing no new orders, but refuse to accept shipments on old contracts. One rolling mill is closed down for lack of business. The Otis Steel Co. now offers $10.50 a gross ton for heavy steel, against $11 a week ago. We reduce quotations to $10.50 to $11.

The Banfield Clay Co., Irondale, O., announces its new plant was placed in full operation March 1. The plant is equipped to manufacture building brick, fireproofing, flue lining, mill brick, wire cut paving brick and repressed paving block. Daily capacity is given at 200 tons clay products.

The tri-annual meeting of the Central Supply Association was held at the Sherman House, Chicago, Feb. 25.

(For Complete Prices see page 486)

Foreign Iron Invades East

Round tonnage of Dominion pig imported—Will compete with southern irons

Office of THE IRON TRADE REVIEW,
New York, March 3.
503-4 West Street Bldg.,

Foreign iron in quantity has actually invaded the eastern market, sales of from 15,000 to 20,000 tons of its Wabana foundry grades having been closed by the Dominion Iron & Steel Co., of Sydney, Nova Scotia, which recently effected an arrangement with a leading selling house to offer a fixed tonnage of this metal in this country. Cast iron pipe makers in eastern Pennsylvania, including the United States Cast Iron Pipe & Foundry Co. and R. D. Wood & Co., have purchased the bulk of this tonnage, but some sales have been made in New England. While the prices have not been definitely fixed, $13.50, Philadelphia docks, is understood to have been quoted and some small sales have been made at $14 at docks, equivalent to $15.90, New England. The iron at present is to be received at Philadelphia and trans-shipped to other points. The iron sold is largely for third quarter, but the first cargo is expected to arrive this month. Only foundry iron is being offered and this is of special quality, running 1.50 in phosphorus, from 2 to 3.25 in silicon and 0.40 to 0.60 in manganese. For that reason, the imported material will not be directly competitive with the mass of eastern foundry grades, but for general mixture purposes, will oppose most of the Tennessee, some Alabama and some northern irons which have been used in limited quantities by eastern melters. There have been no further developments in the negotiations to import Indian iron.

The pig iron market in this district continues fairly active. The Warren Foundry & Machine Co., Phillipsburg, N. J., has taken several thousand tons additional for second and third quarter, making its total recent purchase 10,000 to 15,000 tons and still figures on some tonnage of low and medium silicon iron for last half. The Central Foundry Co., as previously reported, continues to negotiate for 5,000 to 10,000 tons of low grade iron for last half. A Bayonne, N. J., boiler manufacturer, who recently asked 1,000 tons, has closed for a round tonnage of foundry grades. The Crane Valve Co., Bridgeport, Conn., has closed an inquiry for 1,000 tons of high silicon. The New York Central railroad bought a small tonnage of foundry at $13.25, Buffalo, and the Lackawanna railroad asks 400 tons of No. 2. The McNab & Harlan Mfg. Co., Paterson, N. J., wants 1,800 tons of Nos. 1X and 2X for second quarter. Buffalo iron gains strength and $13.25 for No. 2X more generally represents minimum, though makers will accept $13 for silicon under 2 per cent. Some eastern Pennsylvania makers have sold for last half at 50 cents advance, but makers usually ask more or will not quote for that period.

Ferro-Alloys

The Colorado Fuel & Iron Co. has closed against an inquiry for 5,000 tons of ferro-manganese. It is not known whether the full tonnage was taken, but 1,000 tons went to German makers. New sales of this material are few. Prices remain $39 to $40, seaboard.

Plates and Shapes

The Carnegie Steel Co., it is understood, will supply the 50,000 tons of plain material for the third tracking of the Second, Third and Ninth avenue elevated lines, this city, under an arrangement just made with the general contractors. Bids on the fabrication, however, now are being taken. Shipments will run over two years. New business in structural shapes in this district is lighter, but pending tonnage is heavy. The going price is 1.20c, Pittsburgh, or 1.36c, New York, but this could be shaded on very large tonnages. A similar condition rules in plates, where 1.20c, Pittsburgh, is the open market.

Iron and Steel Bars

The 1.20c, Pittsburgh, price on steel bars has not yet disappeared, though the lighter volume of new business leaves the situation somewhat indefinite. Specifications generally are good. Iron bars are unchanged at 1.30c to 1.35c, New York.

Cast Iron Pipe

New tonnage remains good, but prices are irregular. Some makers continue to sell around $19 at the foundry for the larger sizes. Rochester takes bids Nov. 11 on 8,700 tons of 36-inch. Newark, N. J., is out for 1,200 tons of 12 and 16-inch. R. D. Wood & Co. again are low on the re-letting of the 3,550 tons for Boston, but there is a possibility that this requirement may be offered again.

Old Material

Leading dealers report the scrap market in this district to be dormant. Very inclement weather conditions, now prevailing, continue to retard the movement of material and this helps to give the situation an air of general inactivity. Eastern Pennsylvania steel makers, with one exception, have not shown any change in their disinterested attitude towards tonnage lots at ruling prices. One of these interests, as reported, has increased its offers to $11.50, delivered, for heavy melting steel, but as far as known, has not bought any large lots at this figure. Prices are unchanged, but are practically nominal.

(*For Complete Prices see page* 486)

Record for Employes Subscribing

More employes of the United States Steel Corporation have subscribed for stock under recent annual offering than during any other year in history. The number subscribing, 42,393, has been made public by George W. Perkins in a letter written in reply to an attack upon him by Senator William E. Borah and just published. The subscribers this year took an aggregate of more than 80,000 shares of stock, at 105 for the preferred and 57 for the common stock.

The number of employes subscribing and the shares taken, in other years, as shown by the official reports, have been as follows:

Year.	No. employes.	Shares taken.
1913	36,119	60,344
1912	36,946	61,354
1911	26,363	48,348
1910	17,444	24,672
1909	19,192	40,700*
1908	24,884	50,075
1907	14,169	27,032
1906	12,256	23,989
1905	8,429	17,963
1904	10,248	32,519
1903	27,379	48,893

*Estimated.

City Buys Cranes.—The department of wharves, docks and ferries, Philadelphia, recently took bids for an electric locomotive crane in which the Brown Engineering Co. was low at $4,800 for a 75-horsepower machine. Manning, Maxwell & Moore were the low bidders for the furnishing and erection of electric hoists for the Dock street pier.

W. L. Humason, of the Humason & Beckley Mfg. Co., New Britain, Conn., has obtained control of the Peck & Young Co., Forestville, Conn., which manufactures springs and brass turned work. F. N. Manross, who has been running the latter concern for some time, will retire. Mr. Humason plans to add new lines of manufacture and enlarge the capacity of the plant.

Buffalo Market Improves

February was a dull month with furnaces—Prices stiffening

Office of THE IRON TRADE REVIEW,
Buffalo, March 3.

The pig iron situation is improving steadily, although February is always a dull month with the furnaces. Quiet as things have been on the surface, a considerable amount of business has been coming along, bringing the sales for the week up to fully 12,000 tons of all grades. Prices have again stiffened and now there is practically no iron to be had at less than $13, unless it is a limited amount of low or off grade iron. The demand includes a considerable buying of charcoal iron, the price of which has also stiffened. Less than 1,000 tons were disposed of below the quoted schedule, but this was done in cleaning up a stock held by an interest that was not a producer. The prevailing demand for all grades is for early delivery and in fairly small lots, but aggregating a volume of business that gives promise of a fairly heavy amount of trading as spring opens. Furnaces are not disposed to book contracts for requirements beyond the end of the first half. Practically no business is being taken for third quarter and last half needs.

Finished Material

There is a feeling reflected by all the mills and agencies of the district that the March buying will reach considerable proportions, and that the general buying in evidence in January will again materialize. Some of the interests report that February totals were below those of January, due partly to the shorter month and to the lull in buying that spread over a considerable portion of the month. This has occasioned no weakening in prices. All of the producers are holding firmly to announced schedules. A fair volume of business was booked here in the past month and all confidently look for a steady improvement in the market situation.

Old Material

There is a good steady demand reported for all the items on the list, with car wheels leading in the amount of activity at prevailing prices. Since the scrap business has arrived at a settled basis, the yards are placing larger tonnages and consumers are taking advantage of this attitude on the part of dealers. While prices were going up the only trading was limited to small lots and for nearby requirements. With every indication that the schedules quoted will remain about the same for some little time, the yards are now moving a considerable tonnage on 30 to 60 days' deliveries. Prices remain the same as quoted a week ago.

Plants Resume at St. St. Louis

Office of THE IRON TRADE REVIEW,
St. Louis, March 3.

The National Enameling & Stamping Co. is running full force, having taken on a large number of men this morning, and the American Steel Foundries is repairing its entire plant preparatory to resuming operations on a large scale.

One inquiry for 500 tons of charcoal pig iron for delivery in Mount Vernon, Ill., is about all of the business in sight today. Local agents declare, however, that they are not surprised, as the heavy buying toward the close of the year supplied foundries with enough iron to last quite a while. Demand for shipments on contracts is greater than the furnaces can meet, except with difficulty. While it is freely admitted that plenty of southern No. 2 pig can be bought at $11, or perhaps $10.50 for special brands, most of the local agents insist that $11.50 more nearly reflects the market, and refuse to quote less.

Chicago iron is held at $14.25, furnace, and Ironton at $13.50. One local agent reports sales amounting to 1,000 tons last week, made up of various grades and small tonnages.

The coke market for 72-hour Connellsville foundry coke is about $2.60 to $2.75, with 48-hour furnace grades selling at $2.25. There is scarcely any inquiry out, but the demand for deliveries on contracts is exceeding heavy.

Although prices on some grades of scrap went off toward the latter part of last week, lists are out today by the Wabash Railroad Co. for 1,500 tons, closing Thursday, and by the Missouri-Pacific for 1,700 tons, closing Wednesday.

Transfers Business

New York, March 3.—Edwin L. King, receiver of the Pratt & Cady Co., Hartford, Conn., since September, of 1912, has transferred the property and business to the Pratt & Cady Co., Inc., of New York, which yesterday assumed control, having taken up the option for the purchase of the old company, which was obtained last August by Bishop White, of New York. The new corporation is capitalized at $600,000 and will manufacture brass, iron and steel valves, cocks and hydrants, retaining the present factory and sales force. W. B. Lasher, of Bridgeport, has been elected president; W. F. Whitmore, Hartford, vice president and general manager, and Mr. White, secretary and treasurer. Mr. King is to become secretary of the new company.

(For Complete Prices see page 486)

METAL MARKETS

New York

March 3.

Copper.—Demand for refined copper continues dull and the market quotations are only nominal. Leading producers have offered to sell electrolytic at less than 14.50c, delivered at European points, which is equivalent to less than 14.37½c, cash, New York. The present statistical position is satisfactory and the development of a buying movement undoubtedly would harden prices. Prime casting copper now can be had at 14.25c cash New York and probably less. The prime lake market continues out of all relation to the electrolytic market and is quotable at about 14.75c, cash, New York.

Tin.—This market continues featureless and low prices fail to induce buying. Spot and March now are held at 38c, May at 38.25c to 38.37½c and June at 38.37½c to 38.50c.

Lead.—Demand is exceedingly dull. The leading interest continues to ask 4c as its New York shipment price on 50-ton lots but independent producers are unwilling to sell at this figure.

Spelter.—This market has weakened during the week and prime western brands now are held at 5.30c for New York delivery in 50-ton lots.

Antimony.—Demand for antimony is dull and the market is featureless. Prices on large lots, New York delivery, duty paid, continue as follows: Cookson's 7.25c to 7.35c; Hallett's 7c to 7.25c, United States, 7c to 7.12½c; other brands, 5.87½c to 6.12½c.

Chicago

New metals remain practically stationary at the prices which ruled last week. Spelter is still a shade lower but other quotations are unchanged.

We quote dealers' selling prices f. o. b. Chicago as follows:

Lake copper, carload lots, 14¾c; casting, 14⅞c; smaller lots, ¼c to ⅜c higher. Spelter, car lots, 5.32½c; lead, desilverized, 4.08c; sheet zinc, $7.25, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 39½c; Cookson's antimony, 7½c; other grades, 6½c.

So little activity exists in the old metal market that prices are largely nominal. Stocks are comparatively large and the demand is not sufficient to absorb more than a small percentage. Each transaction practically sets its own price regardless of the market quotation.

We quote dealers' selling prices f. o. b. Chicago as follows:

Copper wire, crucible shapes, 13.75c; copper bottoms, 12.00c; heavy red brass, 12.50c; heavy yellow brass, 9.25c; No. 1 red brass borings, 11.00c; No. 1 yellow brass borings, 8.25c; brass clippings, 9.50c lead pipe, 4.25c; zinc scrap, 4.25c; tea lead, 3.75c; No. 1 aluminum, 14.00c; No. 1 pewter, 24c; block tin pipe, 33½c; tin foil, 28.00c; linotype dross, 3c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3c.

Lukens Buys Basic Pig

And others are in the market—Eastern plate mills active

(Owing to the heavy storm prevailing in the east, no mail has been received from Philadelphia and our market report is necessarily confined this week to the following telegrams:)

Philadelphia, March 3. (By wire.)—The pig iron market is less active generally, but some fair tonnage is being taken. The Lukens Iron & Steel Co. has purchased 4,000 tons of March basic at $14, delivered. This delivered price is lower than the last sale, but it nets the selling furnace more. An inquiry for 7,000 tons of prompt basic is pending.

A Harrisburg buyer is reported to have taken several thousand tons of southern basic. Foundry iron remains $14.50 to $14.75, furnace usually, or $15.25 to $15.50, Philadelphia, but one or two makers still will do less.

A Phillipsburg, N. J., buyer took 2,000 tons of forge for second quarter. A Scranton buyer bought 700.

The monthly Eastern Pig Iron Association meeting held today showed an increase of orders in February and some decline in stocks. Brooks furnace is banking.

Some Railroad Orders

Philadelphia, March 4. (By wire.)—Eastern plate makers are operating well. One ran 82 per cent in February, another 80 per cent. These makers have greatly reduced iron stocks held at the first of the year. One of these makers now is running full, but has not much tonnage ahead.

The Southern railway, which has been inquiring for 5,000 tons of steel for cars, has decided not to buy, but will purchase cars instead.

The Baltimore & Ohio has placed 1,000 tons of plates with a Pittsburgh mill. The Pennsylvania is expected soon to specify about 10,000 tons of steel for cars to be built at Altoona. New business in February was not so heavy as January with some makers, but specifications were good.

General Offices Moved.—In order to be in closer touch with the plant, the general offices of the Orenstein-Arthur Koppel Co. have been moved from Pittsburgh to Koppel, Pa., the latter city having been built by the Koppel company. A handsome new office building has been erected and many new additions have been made to this plant, making it one of the largest of its kind in the world.

Higher Prices

For Bessemer and basic pig iron—February averages

Pittsburgh, March 3.

The average price of Bessemer and basic pig iron in February, at valley furnace, was $14.225 and $13.059, respectively, according to an announcement by W. P. Snyder & Co. Averages are based upon sales of 1,000 tons or more. Both grades recorded advances for the first time in five months; Bessemer has advanced three times and basic two times in the last 13 months. The Bessemer average is 3 cents higher and the basic average is 14 cents lower than the average prices based upon quotations of THE IRON TRADE REVIEW.

Compared with actual selling average for January, Bessemer and basic February averages advanced $0.19 and $0.734, respectively. Compared with averages for the corresponding period in 1913, last month's averages for Bessemer and basic declined $3.025 and $3.258, respectively; last month's Bessemer and basic averages are $0.225 and $0.089, respectively, above the averages established in 1912.

About 60,000 tons of basic and 20,000 tons of Bessemer were involved in February sales. Comparisons follow:

	Bessemer.		Basic.	
	1914.	1913.	1914.	1913.
Jan. ...	$14.035	$17.25	$12.325	$16.45
Feb. ...	14.225	17.25	13.059	16.317
Mar. ...	.....	17.25	.....	16.059
Apr. ...	.....	17.008	.....	15.714
May ...	.....	16.78	.....	14.899
June ...	.....	16.2375	.....	14.50
July ...	.....	15.4085	.....	14.227
Aug. ...	.....	15.657	.....	14.045
Sep. ...	.....	15.75	.....	14.1375
Oct. ...	.....	15.703	.....	13.709
Nov. ...	.....	15.125	.....	13.013
Dec. ...	.....	14.842	.....	12.523
Av. for yr.	.....	16.1884	.....	14.6319

Stack Resumes.—The second new blast furnace of the Iroquois Iron Co., South Chicago, Ill., which had been down for relining, was put in blast this week. The old stack which has been in operation while the two new stacks were relined will continue in blast until the stockpile at the furnace is exhausted. The gain in production at the Iroquois plant will be the difference between the output of the old and new stack.

Basic Price Shaded

Pittsburgh, March 4. (By wire.)—A local consumer of basic pig iron has quietly covered March needs at what is understood to be less than $13.25, valley, which has been regarded as the going price of this grade. Various reports have been heard regarding the tonnage involved and the price paid, but none of them has been officially confirmed. The market for steel making grades is quiet.

Sellers of foundry and malleable are refusing to shade $13.50, valley, and some of them are insisting on advances of 50 cents a ton if contracts are allowed to run beyond July 1.

Ferro Sells at $38

Pittsburgh, March 4. (By wire.)—It develops today that both English and German ferro-manganese have been offered by dealers at $38, seaboard, for immediate shipment and circular letters to that effect have appeared in the trade within the last week or 10 days. Although some of these sellers are refusing to shade $40, seaboard, the market appears quotable at a spread of $38 to $40 for nearby shipment, or $1 a ton less than the previous quotation.

Takes Erie Contract

Pittsburgh, March 4. (By wire.)—The Riter-Conley Mfg. Co., Pittsburgh, has taken 850 tons for a machine shop for the General Electric Co., at Erie, Pa., and will furnish a number of steel tanks for the Rollin Chemical Co., at Charleston, W. Va.

The New England Pressed Steel Co. has leased the large cement building on the Boston & Albany railroad, at Washington avenue, Natick, Mass., formerly occupied by the Plympton Mfg. Co.

The Western Society of Engineers, Chicago, will hear a lecture Monday evening, March 9, by Carl Weber, of the Cement Gun Co., on the uses of the cement gun in concrete construction.

The William H. Page Boiler Co., Norwich, Conn., has increased its capital stock from $100,000 to $200,000.

(*For Complete Prices see page* 486)

Many Car Orders Pending

And some orders will soon be placed—Sparrows Point mill resumes

Car orders placed with builders during February reached about 8,000, compared with about 13,000 in January. Several good-sized inquiries of the approximately 10,000 cars now pending in the active list, are about to be placed and builders regard developments in February practically in line with the improvement shown in the initial month. In addition to the cars placed with outside shops last month, arrangements were made by certain roads in that period to build several thousand cars in their own shops. The Virginia Southwestern has increased its recent order for 400 gondolas to 935 and the Reading is understood to have placed practically its order for 1,000 hoppers. Rail orders in some directions show improvement. Total orders in February reached about 185,000 tons. The Maryland Steel Co. is starting its Sparrows Point mill, which has been idle since before the holidays. This maker has taken 12,000 tons from the Atlantic Coast Line. The Pennsylvania Steel Co. will furnish 3,000 tons of Mayari open-hearth rails for the Great Northern, which is a part of the 15,000 order reported last week. The Bethlehem Steel Co. took 3,800 tons of running and 350 tons of guard rails, and the Manganese Steel Rail Co. 550 tons of manganese steel rails for New York subways. A considerable quantity of track accessories for the same purpose has been distributed. Some makers are quoting standard spikes more firmly and hold for 1.45c to 1.50c, Pittsburgh. The recently reported order for the Baltimore & Ohio railroad placed with the Jones & Laughlin Steel Co., is for 30,000 kegs.

Although comparatively few orders for railroad cars were placed in the western market the past week, indications are that a number of inquiries pending will be closed shortly and renewed activity will exist in this department. The St. Louis & Southwestern is in the market for 1,000 to 2,000 cars and the Texas & Pacific has inquired for 1,000 gondolas and 500 box cars and 100 steel passenger cars. The Mt. Vernon Car Mfg. Co. has taken 500 box cars from the Florida East Coast railroad.

CAR AND LOCOMOTIVE ORDERS.

The Virginia Southwestern, which placed 400 gondola cars with the Pressed Steel Car Co., as previously reported, has increased this order to 935 cars.

The Hocking Valley railroad has placed six Pacific and six Mallett locomotives with the American Locomotive Co.

The Lake Erie, Franklin & Clarion has placed one locomotive with the American Locomotive Co.

The Southern Railway Co. has placed an order for 10 superheater Pacific type passenger locomotives and 17 superheater Mikado freight locomotives with the American Locomotive Co.

The Southern railroad has ordered 17 Mikado and 10 Pacific type locomotives from the American Locomotive Co.

The Reading railroad which has been inquiring for 1,000 hoppers is said to have placed this order with the Cambria Steel Co.

The St. Louis & Southwestern is in the market for 2,000 cars.

The Texas & Pacific is negotiating for 2,000 cars, including 1,600 gondolas.

The Buffalo, Rochester & Pittsburgh railway has placed two superheater Pacific type passenger locomotives and five Mallet compound superheater locomotives with the American Locomotive Co.

Awaiting the Final Action

On large tonnages of structural material—Contracts being placed slowly

Awards of structural steel are being placed slowly in eastern districts and as new inquiries are good, a heavy tonnage has accumulated. Fully 40,000 tons of work, exclusive of subway and elevated contracts in the metropolis, now await final action. Bids already are in on the major portion of this tonnage. The fabricated work for subway and elevated work outstanding at this time, totals about 70,000, including 49,781 tons for the third tracking of the Second, Third and Ninth avenue elevated roads, Manhattan, the plain material for which has just been placed.

Considerable structural steel will be required by the Cincinnati, New Orleans & Texas Pacific railroad for its new bridge across the Ohio river at Cincinnati, and by the Chesapeake & Ohio railroad for its bridge to be erected across the Ohio river at Portsmouth, O. The structures will cost about $2,000,000 each. Plans and specifications are being prepared.

Western Lettings

Structural lettings in the west the past week have been about 3,700 tons, in addition to the steel required for the Memphis bridge. A considerable tonnage remains pending in various items, included in which is the Lumber Exchange building, Chicago, 1,000 tons, Holabird & Roche, architects, and about 1,000 tons for the grand stand at the new Federal League base ball park. The reinforced concrete stand at this park will require considerable tonnage of reinforcement bars.

Conditions in the Pittsburgh district again are quiet, and the situation from the fabricators' standpoint is not so attractive as it was a month ago. Prices, however, have stiffened slightly the last few weeks. Contract for the Bell Telephone building probably will be awarded in the east.

CONTRACTS AWARDED.

Great Northern Railway Co., bridge work, 1,500 tons, to the Wisconsin Bridge & Iron Co.

Duluth, Missabe & Northern Ry. Co., coal dock extension, Duluth, Minn., 1,352 tons, to the American Bridge Co.

Neiman-Marcus Co., building, Dallas, Tex., 368 tons, to Mosher Mfg. Co., Dallas.

Hamilton Mfg. Co., steel work for their plant, Two Rivers, Wis., 362 tons, to the Wisconsin Bridge & Iron Co.

Curtis Door & Sash Co., Warehouse, Chicago, 118 tons, to Hansell-Elcock, Chicago.

Terminal improvements, Delaware, Lackawanna & Western railroad at Buffalo, originally figured to require 5,000 tons of steel, now officially stated to have gone concrete. Train shed about 700 tons, steel to be placed.

Addition to plant of Commonwealth Ice & Cold Storage Co., Boston, 1,500 tons, awarded to New England Structural Co. The American Bridge Co. will supply 1,000 tons of beams for this work.

Goelet loft building, Nineteenth street, New York City, 900 tons, awarded to the Hinkle Iron Works.

Shoe manufacturing building, Endicott, N. Y., 500 tons, awarded to the American Bridge Co.

Courthouse, Albany, 2,000 tons, W. L. Crow Construction Co., New York City, awarded general contract.

Textile mill building, Garfield, N. J., 200 tons, awarded to Phoenix Bridge Co.

Section No. 9 of the White Plains subway extension, New York City, 12,000 tons, steel now formally placed by general contractor the Oscar Daniels Co. with the American Bridge Co.

Section No. 6 of the Seventh avenue subway, New York City, 4,800 tons, steel placed by general contractor, the Rapid Transit Construction Co. with the American Bridge Co.

Husted Milling Co.'s new elevator at Buffalo, Monarch Engineering Co., Buffalo, general contract.

Corrugated Bar Co., Buffalo, received contract for 600 tons reinforcing bars.

Buffalo Structural Steel Co. received contract for 500 to 600 tons structural material for elevator "head house" and marine tower.

Lackawanna Bridge Co. awarded 1,500 tons

for Alaska Gastineau Mining Co.'s concentrating plant, Alaska.

CONTRACTS PENDING.

First National Bank building, Minneapolis, 3,500 tons, bids taken.

Office building for Brooklyn Trust Co., Montague street, Brooklyn, 500 tons, bids taken.

Grandstand for Federal League Baseball Club, Brooklyn, 1,000 tons, bids entered.

Coal tower for New York Edison Co. at Thirty-eighth street and East river, New York City, 360 tons, bids pending.

Toll bridge, Norfolk, Va., 1,200 tons, preliminary bids asked.

Hotel Monroe, Norfolk, Va., 350 tons, bids asked.

Lehigh Valley bridge at Weedsport, N. Y., 360 tons, bids pending.

Lehigh Valley railroad extention of pier, Brooklyn, 300 tons, bids pending.

Section 6 A Seventh avenue subway, New York City, now estimated to require 450 tons.

Troop B. Armory, Syracuse, N. Y., 800 tons, Keepery Construction Co., New York City, low bidder on general contract.

Johnson-Kahn loft, Twenty-seventh street and Fifth avenue, New York City, bids asked. Originally estimated to require 4,000 tons.

Machine shop, General Electric Co., at Erie, Pa., 1,000 tons.

Lumber Exchange building, Chicago, 2,500 tons.

Theater building, Pittsburgh, to be erected by Harry Davis and others.

New York State Erie-Barge canal terminal will require a large tonnage of steel sheet piling. Ready for bids about April 1.

General Electric Co., Erie, has received bids for 800 tons of structural material for a machine shop addition to its plant.

New Institute Members

The annual spring meeting of the American Iron and Steel Institute will have its headquarters at the Waldorf-Astoria, New York City, the directors of the institute having determined upon this matter at their regular monthly meeting, Friday, Feb. 27. The directors admitted 75 names to the associate membership of the institute, pursuant with the recent amendment of the constitution to provide such a class of members. About 25 names also were added to the active membership list.

Active Members.

Clarence M. Fenton, Columbus, O.
Fred E. Gage, Worcester, Mass.
T. M. Girdler, Atlanta, Ga.
W. J. Hartley, Atlanta, Ga.
R. W. Hastings, Atlanta, Ga.
George W. Hewitt, Wheeling.
Thomas M. Lavelle, Pottsville, Pa.
R. R. Luckie, Atlanta, Ga.
C. L. McGowan, Atlanta, Ga.
Patrick Noble, San Francisco.
Charles R. Phipps, Buffalo.
Matthew J. Scammell, Sparrows Point, Md.
William Biggs Seaton, Ashland, Ky.
Daniel M. Stackhouse, Johnstown, Pa.
Arthur W. Taylor, Alabama City, Ala.
Hugh P. Tiemann, Pittsburgh.
Daniel Wells, Detroit.
Frank B. Williams, New Haven, Conn.
Jas. H. Plummer, Sidney, Nova Scotia.
J. P. McNaughton, Sidney, Nova Scotia.
Martin, Sidney, Nova Scotia.

Associate Members.

Harry J. Allen, Alliance, O.
Fred L. Baker, Los Angeles, Cal.
Daniel M. Barringer, Philadelphia.
John C. Cromwell, Cleveland, O.
William C. Cuntz, New York City.
Joseph T. Dougherty, Pittsburgh.
Franz H. Hirschland, New York City.
Evan F. Jones, Worcester, Mass.
Joseph K. Larkin, New York City.
Walter Smart McKee, Chicago.
Henry M. O'Bleness, Pittsburgh.
Charles F. Quincy, New York City.
Harlow Dow Savage, Ashland, Ky.
George Johnson Walker, Pittsburgh.
Wm. R. Webster, Philadelphia.
Wm. H. Hill, Chicago.
Chas. Foster, Chicago.
John B. Arnold, New York City.
Wm. Howland Ball, Detroit.
E. H. Bell, Chicago.
Louis V. Blue, Pittsburgh, Pa.
Chester C. Bolton, Cleveland.
C. Arthur Brown, Chicago.
Walter P. Burdick, Kalamazoo, Mich.
Albert L. Colby, South Bethlehem, Pa.
Alfred Crook, Philadelphia.
William T. Dean, Chicago.
Henry S. Derbyshire, Chambersburg, Pa.
Omar S. Decker, Pittsburgh.
Wm. Dette, 30 E. 42d St., New York City.
Harry S. Durant, Chicago.
Berthold Fleersheim, Pittsburgh.
Park B. Garoutte, Chicago.
Charles J. Graham, Pittsburgh.
John L. Green, St. Louis.
Alex. K. Hamilton, Chicago.
Joseph Hartshorne, Pottstown, Pa.
Richard D. Hatton, St. Louis.
Edward Hazlett, Wheeling.
Albert J. Hess, Chicago.
Harry C. Holloway, Chicago.
Charles S. Hurd, New York City.
Winthrop Ingersoll, Rockford, Ill.
Charles R. Knapp, Pittsburgh.
Heinrich Koppers, Chicago.
Charles J. Mesta, East Chicago, Ind.
M. W. Mix, Mishawaka, Ind.
Wm. R. Morgan, Alliance, O.
J. Weidman Murray, Pittsburgh.
James H. Nutt, Youngstown, O.
H. A. Parks, Chicago.
Bernard S. Pease, Chicago.
Richard Peters, Jr., Uniontown, Pa.
Fred A. Poor, Chicago.
John Hudson Pooles, Detroit.
W. S. Potter, Pittsburgh.
Joseph T. Ralston, Columbus.
Otto M. Reif, Pittsburgh.
N. F. S. Russell, Philadelphia.
Henry B. Rust, Pittsburgh.
Kenneth Seaver, Pittsburgh.
James E. Sime, Chicago.
Henry A. Squibbs, Chicago.
Floyd K. Smith, Sharpsville, Pa.
Chas. G. Stevens, Chicago.
Edwin R. Stoughton, Detroit.
Allen Strale, Chicago.
John C. Waters, Johnstown, Pa.
Willis J. Wooldridge, Pittsfield, Mass.

The Cincinnati Sheet Metal & Roofing Co., Cincinnati, has increased its capital stock from $50,000 to $100,000. This was done to allow sufficient capital to purchase a new plant and to enlarge the company's manufacturing facilities. The officers are: President, E. G. Ruder; vice president, B. R. Millikin, and secretary and treasurer, H. L. Olden.

Pennsy Retrenches

Pittsburgh, March 3.—The Pennsylvania railroad, in accordance with a retrenchment policy apparently adopted by railroads throughout the country several months ago, has taken off 14 passenger trains operating between Pittsburgh and eastern and western points, within a 50-mile radius, and has reduced the service between New York and Philadelphia, Philadelphia and Harrisburg and Harrisburg and Washington. Unofficial announcements in railway circles state that other roads contemplate similar reductions in passenger service. Thousands of commuters are affected in this district.

Prof. Baker Honored

In commemoration of 40 years' continuous service at the University of Illinois, a banquet will be tendered Prof. Ira O. Baker, at the La Salle hotel, Chicago, Tuesday evening, March 17. About 400 are expected to be present. Prof. Baker is the head of the civil engineering department and is a member of the class of 1874, which was the first class of engineers to be graduated at Illinois. He has been prominently identified with the progress of civil engineering in the United States for nearly half a century and is a member of the American Society of Civil Engineers. He is the author of a standard work of reference on masonry construction.

The Stanley Works, New Britain, Conn., at a meeting of the stockholders, voted to adopt the recommendation of its directors that the capital stock of the company be increased from $2,000,000 to $2,500,000. The stock will be apportioned among present stockholders.

The National Roll & Foundry Co., Avonmore, Pa., has received a contract for a combination 19-inch and 14-inch Belgian guide mill for installation in the plant of the United Steel Co., Canton, O. The mill will be used for rolling vanadium steel products.

F. A. Houdlette & Sons, operating an iron foundry in South Boston, Mass., are looking for a location for a new foundry near the Mystic river. They intend to manufacture cast iron water pipe.

The Mechanics Iron Foundry Co., 88 Reading street, Roxbury, Mass., has been issued a building permit for the erection of a frame story.

Shows Gain in Pig Iron Output

February, while shorter month, makes increase over January—More furnaces in blast

Emphatic confirmation of the enlarged activity of blast furnace operations during February, is furnished by the record of pig iron production during last month. The total output of coke and anthracite pig iron was 1,888,416 tons, compared with 1,879,336 tons in January, a gain of 9,080 tons. This increase is the more expressive in view of last month having three less working days than January.

It is in the average daily production that the partial resumption last month is more clearly shown. The average daily output during February was 67,443 tons compared with 60,624 tons in January, a gain of 6,819 tons. February registered the first gain in tonnage and average of any month since September. Last month's average production compares with 92,095 tons in February a year ago, which holds the record for high average output.

MONTHLY PRODUCTION.

	1914.	1913.	1912.
January	1,879,336	2,787,800	2,052,806
February	1,888,416	2,578,670	2,098,796
March	.....	2,762,823	2,411,529
April	.....	2,754,353	2,377,621
May	.....	2,816,825	2,503,341
June	.....	2,616,883	2,433,737
July	.....	2,558,275	2,402,567
August	.....	2,537,018	2,500,163
September	.....	2,494,098	2,444,454
October	.....	2,539,924	2,683,645
November	.....	2,229,960	2,639,562
December	.....	1,976,138	2,777,292
Totals	3,767,752	30,652,767	29,325,513

In active stacks, a considerable increase is shown, comparing the last days of February and January. On Jan. 31, 199 blast furnaces were active, while on Feb. 28 there were 219 furnaces reported in blast. The gain of 20 in the active list was due almost entirely to the steel works or non-merchant furnaces, 21 of which blew in last month while 3 were put out, a net gain of 18. Of the merchant furnaces, 4 were relighted in February and 2 blown out, a net gain of 2. In all, 25 furnaces were blown in last month and 5 were blown out. It was the first time in 10 months that the list of active stacks has shown an increase.

AVERAGE DAILY PRODUCTION.

	1914.	1913.	1912.
January	60,624	89,929	66,220
February	67,443	92,095	72,372
March	.....	89,123	77,791
April	.....	91,812	79,254
May	.....	90,865	80,753
June	.....	87,229	81,125
July	.....	82,525	77,502
August	.....	81,839	80,650
September	.....	83,137	81,482
October	.....	81,933	86,569
November	.....	74,322	87,985
December	.....	63,746	89,590

As during the decline of the past 10 months, it was the steel works furnaces that registered the greatest losses, so it is those plants that were responsible for the gain made in February. Production of non-merchant iron in February was 1,309,033 tons, against 1,227,156 tons in January, a gain of 81,877 tons.

The merchant furnaces produced 556,540 tons of iron in February and 628,662 tons in January, a loss of 72,122 tons. In average daily output, the merchant furnaces showed a production of 19,876 tons in February and 20,279 tons in January, a loss last month of 403 tons. The steel works furnaces averaged 46,751 tons in February, against 39,586 tons in January, a gain last month of 7,165 tons.

The output of ferro in February was 18,005 tons, compared with 18,230 tons in January, a loss of 225 tons. The production of spiegel in February was 4,838 tons, against 5,288 tons in January, a loss of 450 tons.

FEBRUARY PIG IRON

States.	No. of stacks.	No. in blast last day of month. Feb.	Jan.	Total tonnage made. Merchant.	Non-Merchant.	——Totals—— Feb.	Jan.
Pennsylvania	158	87	80	140,068	665,581	805,649	805,911
Ohio	73	46	44	122,311	326,328	448,639	428,572
Alabama	46	21	19	104,154	32,200	136,354	155,638
Virginia	22	8	8	26,165	.....	26,165	29,637
New York	26	12	10	65,974	35,304	101,278	102,597
New Jersey	7	2	2	10,155	.....	10,155	11,341
Illinois	26	15	12	26,688	121,093	147,781	140,931
Colorado	6	2	2				
Indiana	10	8	6				
Maryland	4	1	1				
Wisconsin	6	3	3	20,035	112,339	132,374	123,767
Kentucky	7	2	1				
West Virginia	4	3	2				
Tennessee	18	5	5				
Washington	1	0	0	17,405	16,188	33,593	31,126
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1				
Michigan	3	3	3				
Missouri	1	0	0	23,585	.....	23,585	26,298
Spiegel—All states...						4,838	5,288
Ferro—All states....						18,005	18,230
Totals	424	219	199	556,540	1,309,033	1,888,416	1,879,336

Fabricating Company Changes Policy

The Modern Steel Structural Co. of Waukesha, Wis., a large fabricator and erector of structural steel, bridges, etc., has undergone important administrative changes and adopted a policy of expansion of activity and territory. Samuel B. Harding, founder and president of the company, has retired and is succeeded by Charles J. McIntosh, of Milwaukee, who acquired an important financial interest in the concern about a year ago, and has acted in an advisory executive capacity since that time. Mr. Harding retains his interest and continues as a member of the board of directors, also acting as consulting engineer. Frank W. Harding retires as vice president, and is succeeded by J. T. Cheney, of Chicago. G. W. Helmer continues as secretary. R. A. Raschig was elected treasurer, succeeding Mr. McIntosh, who has occupied that position for a year. The new board of directors consists of C. J. McIntosh, J. T. Cheney, W. P. Sawyer, C. A. Haertel, A. W. Fairchild, S. B. Harding and E. R. Estberg.

Westinghouse, Church, Kerr & Co., 37 Wall street, New York City, have established a laboratory for the purpose of testing concrete aggregates, waterproofing materials, investigating paints and preservative coatings for steel and concrete.

At the annual meeting of the Cincinnati Milling Machine Co., Oakley, Cincinnati, O., the following officers were re-elected for the ensuing year: President, Fred A. Geier; vice president and secretary, C. Wood Walter; and treasurer, P. O. Geier.

Rebate Charge Collapses

When "wolf of wall street" fails to produce evidence

Washington, March 4. (By wire.)—Hearing as to alleged rebates accepted from its transportation subsidiaries by the United States Steel Corporation were abruptly adjourned this morning by Commissioner Harlan until further notice. This probably means the end of the entire matter. Lamar, "the Wolf of Wall Street", submitted an old agreement between the Federal Steel and Carnegie Steel companies relating to ore shipments over the Duluth & Iron Range, and admitted finally he had nothing not already in the government records in one form or another. Mr. Harlan told Lamar that this commission and not Lamar will conduct the case in response to the Senate resolution.

C. A. Severance, for the Corporation, gave notice that he did not care to cross examine witnesses.

Thomas Iron Co. Will Issue Bonds

At the special meeting of the stockholders of the Thomas Iron Co., held at Hokendauqua, Pa., Feb. 26, it was almost unanimously voted to authorize the issuance of $1,000,000 in 20-year bonds, $600,000 of which will be issued at once, and $400,000 will be retained in the treasury, to be issued only after submitting the question to the stockholders.

More stock was represented at this meeting that at any previous meeting of the company, and the result shows that there were 43,973 shares out of a total of 50,000 shares voted in favor of the issue, and only 715 against the issue. Of this total issue, $400,000 will be applied towards the payment of the floating indebtedness, and $150,000 will be used for present needs as working capital. No extensions to the company's plants are in contemplation at present, but repairs will be made on No. 3 furnace at Hokendauqua and No. 8 furnace at Alburtis.

In the discussions and reports at the meeting it was made known that the company in its 60 years of continuous operation had spent $100,123,000 for materials, supplies and labor. The company is now operating one furnace at Alburtis, one at Hokendauqua, its magnetic iron ore mine (Richard mine), near Wharton, N. J., and one small local hematite mine in Lehigh county, Pa.

Disposing of Cars

Nearly all of the larger operators in coal and coke in the Pittsburgh and Connellsville districts have disposed of their rolling stock during the past three years, as they find that the service of the railroads is superior to their own, and the policy of the Interstate Commerce commission gives owners of private cars no advantage over other shippers. The Oliver Iron & Steel Co. is said to be the only company in the Connellsville field owning its own cars.

Metal Trades Meetings

Additional dates for annual meetings of branches of the National Metal Trades Association have been set as follows: Chicago, March 10; Hartford, Conn., March 31; St. Louis, March 11. The branches at New York and the Tri-Cities, Moline, Davenport and Rock Island, have not been set. The branch at Worcester, Mass., will omit its usual annual meeting this year on account of the national convention assembling there, and will hold only a formal business meeting.

Prices Are Firmer

The retiring directors were re-elected at the annual meeting of the Empire Steel & Iron Co., held at Jersey City, Feb. 25. President Leonard Peckitt stated that while conditions in the pig iron industry were not quite what he would like to see them, he considered that prospects for business this year were better. Pig iron was moving in larger quantity and prices were firmer than they had been for a long time, he added.

Spotting Charges

A vigorous protest is to be registered by the Illinois Manufacturers' Association against the proposed charge by railroads for "spotting" cars on side tracks. John M. Glenn, secretary of the association, has gone to Washington to make the protest.

In a letter sent to the commission before his departure, Mr. Glenn says in part:

"It is the evident intent of your commission to authorize the railroads to make an additional charge for services which have always been included in the freight rates. We respectfully protest against any such action on the part of the commission, as we consider it unfair and unjust discrimination against shippers who have supplied themselves at their own expense with additional terminal facilities of which the railroads secure the benefit."

Wire Fencing Advanced

Pittsburgh, March 4. (By wire.)—The American Steel & Wire Co. has advanced wire fencing irregularly, amounting to from 50 cents to $1 per ton, but other wire products are unchanged.

Obituaries

Andrew H. Reeder, vice president and general manager of the Stonega Coke & Coal Co., Big Stone Gap, Va., died at his home in Easton, Pa., on Feb. 26, from a complication of diseases. The funeral was held on March 2, at Easton, Pa.

Henry Pratt, president of the Henry Pratt Co., Chicago, steel construction contractors, is dead, aged 70. He constructed and placed in position the steel tube of the new LaSalle street tunnel, Chicago, and the Michigan Central railroad tunnel under the Detroit river, at Detroit.

Hayward A. Harvey, who has been associated with his father and brother in the Harvey Steel Co., Newark, N. J., committed suicide at Orange, N. J., Feb. 25. He was 45 years of age. Mr. Harvey was a son of the late Hayward A. Harvey, inventor of the process for hardening steel, and had assisted in the introduction of this method in various companies. Unsuccessful investments are believed to have been the cause of the suicide.

Benjamin Illingsworth, a pioneer of the steel industry of New Jersey, died at his home in Jersey City, Feb. 22, at the advanced age of 93 years. He was born in Sheffield, Eng., where he acquired his knowledge of steel manufacture, and came to the United States at the age of 25. In 1848, he became interested in the Adirondack Steel works of Jersey City. Later, he built iron and steel works at Rockaway, N. J., and Pompton Lakes, N. J. After the Civil War, he sold his two plants and founded the Jersey City Steel Works. He retired from active business 25 years ago.

The Connecticut Electric Co., Bridgeport, Conn., is building a three-story brick factory building, 50 x 150 feet.

Shippers Fighting Every Inch

And railroad inquiry at Washington is broadening—
News from national capital.

Washington, March 3.—Hearings before Commissioner Harlan, of the Interstate Commerce Commission in connection with the advance rate case have taken on so many ramifications and in such a complicated form that the original issue at times becomes secondary.

Shippers are showing in no uncertain terms their opposition to the abandonment of present operations with relation to various services on private tracks, which now call for no charge, but for which it is proposed to provide compensation. Upon resuming hearings last Friday, in the matter of free allowances, shippers from all sections of the country, responsible for a tremendous volume of traffic, were represented. These hearings were supposed to have been devoted to the question of making a charge for spotting cars for loading and unloading on private spur and side tracks, and other services in Chicago, but they developed into a broader scope and took in a range of territory well nigh covering all that embraced in the section in which the railroads desire to increase rates. It was found impossible, on account of the many shippers who desired to be heard, to complete the hearings in two days, as originally proposed.

Shippers' attorneys, prominent among them being Luther M. Walter, of the Industrial Traffic League and the Illinois Manufacturers' Association, and Francis B. James pleaded that more time be given shippers to protest the elimination of these free services. They took issue also with data on these services as offered by Attorney Brandeis for the Commission. Commissioner Harlan said all interests would be given due consideration. Mr. Brandeis said it would be out of the question to give each individual shipper an opportunity to be heard and suggested co-operation between shippers and the carriers.

It would seem at this time a question as to whether these involved issues radiating from the original case will delay the decision. Commissioner Harlan has made no official comment as to this point since his statement that there is reason to think the record on the main issues may be closed and the arguments had in time to enable the Commission to dispose of the questions before summer recess. There are a few other hearings related to the matter of free allowances to be held also and it is impossible to say what problems may arise from them and the form they may take tending to further complicate and postpone the case. It should not be taken as a certainty that the case will be postponed at all, but there is some apprehension as to such a result.

In addition to these further hearings, there is also to be taken up, as stated last week in THE IRON TRADE REVIEW, the application of railroad subsidiaries of the United States Steel Corporation protesting against points in the Commission's decision in the Industrial Railways case. It has not been indicated whether this will have a bearing one way or the other in the decision in the so-called 5 per cent case.

The car movement at plants in Chicago was described at the hearing last Friday by H. C. Barlow, of the Chicago Association of Commerce, placed on the stand by Attorney Walter L. Fisher. The movement at the plant of Jos. T. Ryerson & Son was cited as being typical and emphasized the great investment shippers have made and which accrue to the benefit of the carriers. The Ryerson company was said to load on its own property at its steel plant, in its own cars, on its own tracks and entirely at its own expense. Its cars, switched by the Panhandle, are moved at a cost of $6 each for simply taking them out and down to the Chicago Junction railway, only three miles distant.

Rate Approved

Washington, March 3.—The fifth class rate of 34.5c per 100 pounds on a shipment of 40,661 pounds of expanded metal made in July, 1911, by the Trussed Concrete Steel Co. from Youngstown, O., to Marquette, Mich., was not unreasonable or unjustly discriminatory, according to an unreported opinion handed down yesterday by the Interstate Commerce Commission. The complaint was directed against the Erie railroad, et al. It was based on the fact that the fifth class rate by the Lake Shore, et al., was 26.5. The commission held that, in view of the complainant's having specifically routed the shipment over the route taking the 34.5c rate, its protest was not well taken. Effective Sept. 15, 1911, the Erie, et al., reduced the rate to 26.5c.

Rates Declared Not Unreasonable

Washington, March 3.—The Interstate Commerce Commission, in an opinion handed down yesterday, held that rates on scrap and steel billets from New England territory to Perth Amboy, N. J., are not unreasonable or unduly preferential. The decision was the outcome of the complaint of the C. Pardee Works, Perth Amboy, against the Central Railroad Co. of New Jersey, et al. It was charged that the rates on scrap from New England points to Perth Amboy and on steel billets and bars from that point to New England territory were unreasonable per se and unduly preferential of strongly competitive plants in eastern Pennsylvania.

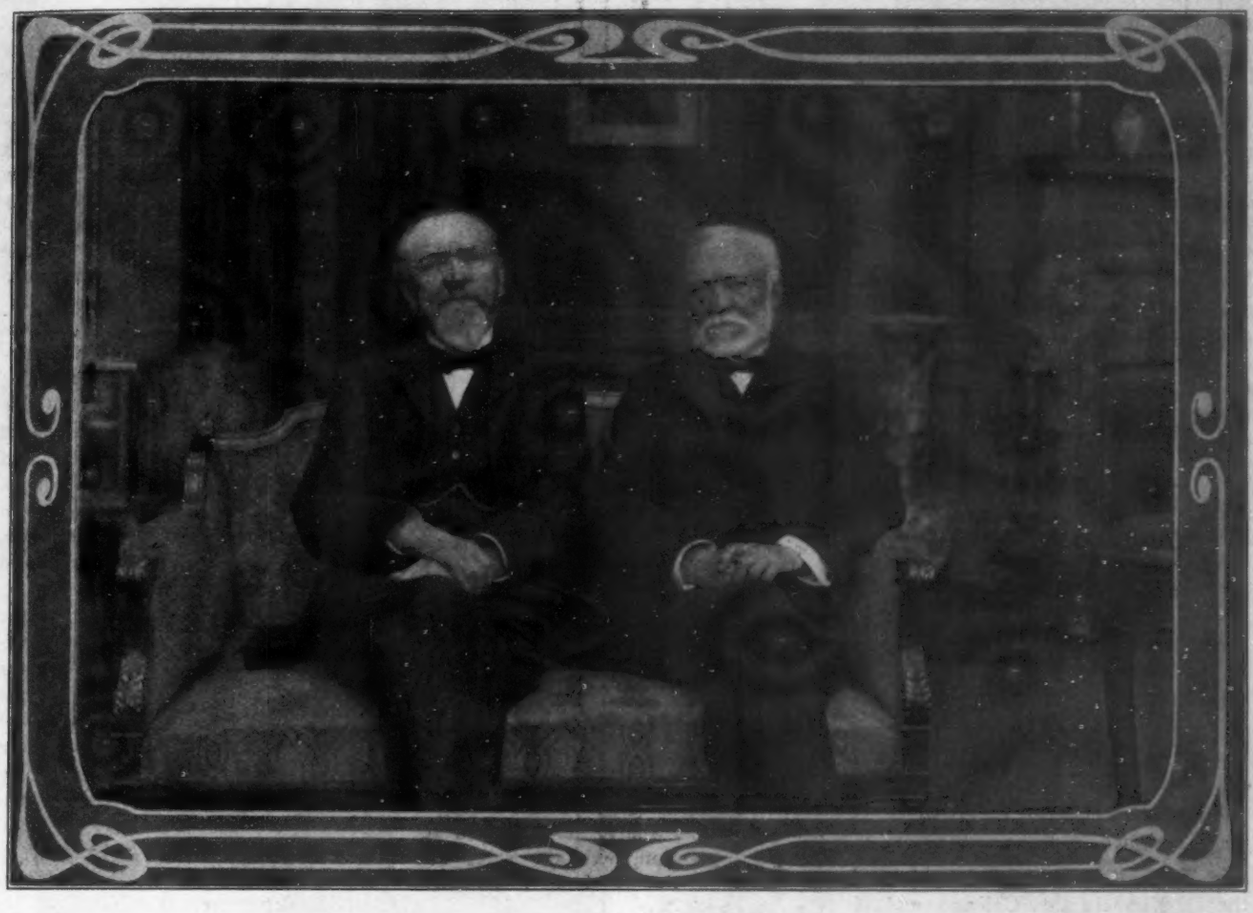
The rates applying to New England points on the manufactured product and from points of origin on scrap iron follow:

	Billets, per gross ton.	Bar steel, per 100 pounds. C. L.	L. C. L.	Scrap iron, per gross ton.
Pittsburgh ..	$3.00	$0.18	$0.21	$3.00
Central Pa....	2.70	.16½	.19½	2.70
Eastern Pa...	2.30	.13½	.16	2.30

Rates on Billets

Washington, March 3.—Application of E. H. Hinton, agent, to establish reduced rates on blooms and billets from Atlanta, Ga., to Ohio and Mississippi river crossings, proposed in a tariff recently filed, has been granted by the Interstate Commerce Commission. Request to establish the new rates is based on the fact that they are made in relation to the rates in effect from Birmingham, Ala. The rates from Birmingham are the same as the new ones from Atlanta save in the cases of to Memphis, Tenn., and beyond, which is $2.50 per 2,240 pounds. The rates from Atlanta to Memphis and beyond will be reduced from 23 cents per 100 pounds to $2.90 and $2.40, respectively. Instead of the present rate of 31 cents per 100 pounds the new rates from Atlanta will be $3.25 per gross ton, save in the instances of Henderson, Hickman, Louisville, Owensboro and Paducah, Ky., whose rate will be $3. The rate to Thebes and Cairo, Ill., on the Mississippi river, will be reduced to $3.25 from 31 cents per 100 pounds.

Carnegie and Phipps---Friends and Former Partners
The Iron Masters as They Look Today



Mr. Carnegie in Moving Pictures

Andrew Carnegie will live in future generations not only by his achievements as a master steel maker but by his spoken words and in visible form. Posterity now is being assured the rare privilege of seeing the ironmaster as he appears in public at the present time, pleading the cause of universal peace and of general good will man to man.

Mr. Carnegie is being "preserved" in the movies. For some weeks past, he has been the interesting subject for a "study" at the Edison Studio, 2826 Decatur Avenue, New York City. An Edison kinetophone—the camera and phonograph combined—is recording for history—gesture for gesture and word for word—Mr. Carnegie as a public speaker while he delivers a five-minute address upon the subject, "The Life of a Man of Wealth."

This address was delivered for the first time at the Cleveland Chamber of Commerce, Tuesday, March 3, to a delighted audience assembled to celebrate the first anniversary of the Cleveland Federation for Charity and Philanthropy.

An interesting photograph taken at the Edison Studio just before the ironmaster engaged in one of his recent "sittings" is reproduced herewith. It shows Mr. Carnegie as he appears today. Seated by his side is his old-time friend and partner in the steel business, Henry Phipps, who furnished the financial acumen so necessary in the struggling days of Carnegie, Phipps & Co., Ltd., and no less important in the later periods of the Carnegie Steel Co., when its operations were the marvel of the business world.

MEN OF THE IRON TRADE

Horace Hudders has been made superintendent of the Allentown Rolling Mills, Allentown, Pa.

H. Pollard has been appointed superintendent of manufacture in the Chicago plant of the Benjámin Electric Mfg. Co., Chicago.

John A. Topping, chairman of the Republic Iron & Steel Co., has gone to the Jekyl Island Club, Jekyl Island, Ga., to spend a month.

Arthur L. Davis, eastern contracting manager of the American Bridge Co., with headquarters at New York City, is detained at his residence by illness.

John P. Munn and Phillip B. Jenning have been elected directors of the Railway Steel Spring Co., succeeding Wm. A. Barnum and Waldo H. Marshall.

E. W. Pargny, president of the American Sheet & Tin Plate Co., Pittsburgh, has been elected a director of the South Side Trust Co., of Pittsburgh.

H. C. Barnhart, of the Marion Steam Shovel Co., Marion, O., has been made secretary and director of purchases, succeeding R. H. Reindenbach, resigned.

H. J. Freyn, third vice president of the H. Koppers Co., Chicago, and H. P. Kirkpatrick, engineer of the same company, were in Cleveland several days during the past week.

E. M. S. Young has been appointed general manager of the Standard Gauge Steel Co., Beaver Falls, Pa. He formerly was associated with the Superior Steel Co., Carnegie, Pa.

Archibald Johnston, first vice president of the Bethlehem Steel Co., has returned from China, where he has been for a number of months past on business matters for his company.

H. D. Dean has been made purchasing agent of the Minnesota & Ontario Power Co. The purchasing department has been removed from Minneapolis to International Falls, Minn.

C. A. Tupper, whose interesting articles on various engineering subjects are familiar to all readers of THE IRON TRADE REVIEW, and who recently resigned as secretary of the Penton Publishing Co., Cleveland, has purchased an interest in *The Mining World*, Chicago, and recently was elected to the position of secretary-treasurer of the Mining World Co.

Frank M. Tait, of Dayton, O., has been re-elected president of the Dayton Power & Light Co., of that city, for the fourth consecutive term. Mr. Tait also is general manager of the company.

C. I. Stralem, of Hallgarten & Co., New York bankers, and Alfred A. Cook, of Leventritt, Cook & Nathan, attorneys, New York, have been added to the board of directors of the Gulf States Steel Co.

H. A. Finkenstaedt has been appointed district sales agent in charge of the Detroit office of the Carbon Steel Co., Pittsburgh, succeeding E. W. Saunders, now district sales agent for the company at Cleveland.

C. P. Perrin, 2 Rector street, New York City, consulting engineer of the Tata Iron & Steel Co., Sini or Sakchi, Indian, who has been abroad at this works, is expected to return to this country the latter part of May.

C. C. Hayward, who has been connected with the Cincinnati office of the Jones & Laughlin Steel Co. for the past three years, has resigned to accept a position with the sales department of the Ashland Fire Brick Co., Ashland, Ky.

Col. J. C. Maben, president of the Sloss-Sheffield Steel & Iron Co., has just returned from an extended trip to Europe. The location of the new coke ovens for the Sloss company is now under discussion, and Col. Maben hopes to make a definite announcement shortly.

Lieutenant Glen Owen Carter, of Cincinnati, has resigned from the United States navy, and will probably be the Cincinnati representative of the Linde Air Products Co., of New York City. This company is considering opening a branch in Cincinnati, and is negotiating with the Factory Colony Co., of Oakley, a suburb, for a suitable location.

William Robertson, treasurer of the Standard Chain Co., First National Bank building, Pittsburgh, has resigned, to devote his attention to the clay business in Beaver county, Pa., of which his son, James L. Robertson, has been in charge. Stanley Mann, former assistant treasurer of the Chain company, has been appointed Mr. Robertson's successor.

Charles E. Dinkey, general manager of the Edgar Thomson Steel Works of the Carnegie Steel Co., at Braddock, Pa., has been elected president of the Braddock Board of Commerce. An effort is being made to have Andrew Carnegie speak at the 25th anniversary of the Braddock Carnegie Free Public Library, April 30. The Board of Commerce will take an active part in the celebration.

John A. Savage, of Duluth, Minn., former general manager and a director of the Shenango Furnace Co., Pittsburgh, resigned March 1. He and several associates have purchased mining properties in Minnesota, and will form a company to be known as John A. Savage & Co., dealers in iron mining and ore land business. Mr. Savage's successor has not been named by the Shenango company.

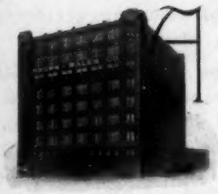
J. E. Bachelder, manager of the steam pump department of the Fairbanks-Morse Mfg. Co., Beloit, Wis., for seven years, has resigned and became vice president and general manager of the Temple Pump Co., Chicago, on March 1. The Chicago concern recently built a new factory and is planning an extensive sales campaign. Mr. Bachelder was tendered a banquet by department heads of the Beloit works upon his departure.

C. J. McIntosh has been elected president of the Modern Steel Structural Co., Waukesha, Wis., succeeding S. B. Harding, who had been at the head of the company for several years. He became interested in the company nearly two years ago as treasurer, after having considerable experience with the J. I. Case Co., at Racine. R. A. Raschig, treasurer, has been with the company as general accountant for some time, following employment with the Allis Chalmers Co., West Allis, Wis. At the recent annual meeting, other officers and directors were chosen as follows: Vice president, J. T. Cheney; secretary, G. W. Helmer; chief engineer, Geo. A. Haynes; board of directors, E. N. Estberg, C. A. Hoertel, W. P. Sawyer, A. W. Fairchild, J. T. Cheney, C. J. McIntosh, S. B. Harding. The sales department of the company has been removed to Chicago, the other departments of the general offices remaining at Waukesha. J. T. Cheney, vice president, is to be in charge of the Chicago office.

Steel Warehouse in New England

Facilities of the Brown-Wales Co. for storing and handling miscellaneous steel products

By E C Kreutzberg



A NEW warehouse strategically located for serving consumers of iron and steel products in New England recently has been erected in Boston by the Brown-Wales Co. It ranks among the largest and most modern plants of its kind in the country and the building is an interesting example of the possibilities of heavy reinforced concrete construction.

A spur track connects the warehouse with the Boston & Maine railroad, while local deliveries are made by motor trucks and horse-drawn vehicles. The interior design of the building is such that material may be moved with the greatest amount of dispatch. The eight stories are commanded by four 5-ton freight elevators, one 300-pound express elevator and a passenger elevator. The stock bins and piles are so arranged as to be readily accessible at all times. Hand trucks and overhead monorail systems also are utilized for conveniently handling material. For the purpose of stock replenishment, an accurate record of all shipments and receipts is kept in order that the company may not be put to the necessity of turning away a customer because of depleted supplies.

The new warehouse is located on a 110 x 265-foot site at the corner of Fargo, C and Egmont streets, South Boston. It is eight stories in height, of brick and steel construction, with floors of arched terra cotta and cement which are capable of supporting a live load of 400 pounds per square foot. The floors are designed to carry 800 pounds per foot, thus giving a factor of safety of two. The first floor is 100 x 260 feet, while the remainder of the building is 100 x 160 feet. The structure is absolutely fireproof throughout and is provided with fire doors, hatches and a sprinkler system.

The first floor, which has a height of 20 feet, is served by a railroad spur of sufficient length to accommodate five cars. The receiving platform is on one side of the track and the shipping platform on the other; both are served by elevators which command all floors.

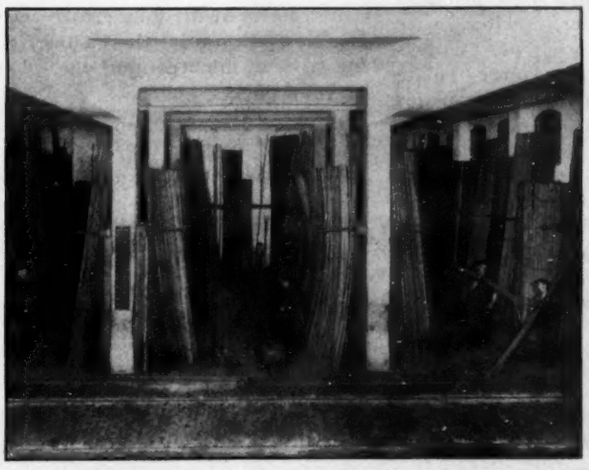


FIG. 1—NORWAY IRON IS STORED ON END IN RACKS

FIG. 2—THE SHEET AND TIN PLATE STORAGE ON THE THIRD FLOOR

Structural Steel Storage

At the end nearest the entrance of the railroad track, a space 100 feet square is devoted to the storage of structural shapes. For conveniently handling this material, this department is provided with an overhead monorail transportation system. A 12-inch motor-driven shear is installed for cutting to length, beams, angles, channels, etc. On the first floor also are kept large stocks of bar mill products. These are arranged in bays, as shown in Fig. 1. The company carries a heavy stock of Norway iron which it receives from incoming steamers that dock at the new Commonwealth pier, about a block away from the warehouse. There are separate bays for the storage of sheets and plates, and all shafting and screw stock is kept in racks in a closed compartment, which is heated to prevent the steel from sweating.

Occupying portions of both sides of the first floor are galleries devoted to the storage of soil pipe and hot water and steam boilers. For cutting merchant iron and steel products, the first floor is provided with a cold saw, a hand shear and a hack saw. A 10-foot squaring shear is used for squaring sheets and plates. In a small basement below the ground floor is located a boiler plant which provides steam for heating the building. All current for electric lighting and power is furnished by the local Edison company and a rectifier for converting alternating to direct current has been installed for charging storage battery trucks.

Sheet steel, tin plate, ternes, galvanized and zinc sheets and wire are stored in racks and piles on the second and third floors. Plumbing supplies are stored on the fourth, fifth and seventh floors. The eighth floor is devoted to the storage of heavy hardware and mill supplies. On the sixth floor are located the offices, a restaurant and a sample display room. Meals now are served to the office staff, while later it is expected to

FIG. 3—A CORNER IN THE STRUCTURAL DEPARTMENT

extend the benefits of this feature to all the employes in the building. In the general office, each department keeps separate records showing stocks of each commodity on hand. Each stock item is given an individual card on which is indicated the number of pieces on hand, as shown by inventory, while shipments and receipts are kept track of by adding to or subtracting from the figure on the card.

The Brown-Wales Co., although one of the largest establishments of its kind in New England, is one of the youngest. It traces its history back to about 1870, when the jobbing firm of Bacon & Brown were doing business on Fulton street in Boston. About 1877, this firm became John G. Brown & Co. and moved to Purchase street, and still later, Manley W. McClure was taken into partnership and the name changed to Brown, McClure & Co. In the meantime, William Q. Wales, who started in 1877 as a partner in the jobbing firm of Richards & Co., on Union street, branched out for himself in 1887, and continued in business alone until 1890. He then joined interests with Brown, McClure & Co., and the firm name was changed to Brown, McClure & Wales. When Mr. McClure died, in 1892, the name was changed to Brown & Wales, Inc., and, in 1903, to the Brown-Wales Co. Mr. Brown died in 1908.

William Q. Wales is president and treasurer of the Brown-Wales Co.; William H. Shurtleff is secretary, and Q. W. Wales, assistant treasurer. The iron and steel department is in charge of Carl Stahleker, and F. H. Chase is manager of the credit department.

The company's products are sold in Boston and throughout the New England states generally, and consist of galvanized, black and blue annealed sheets, American ingot iron products, copper, brass, solder, spelter, wire, zinc, tin, conductor pipe, gutters, ventilators, registers, terne plate, roofing, wrought pipe, bars, plates, angles, tees, beams, channels, hoops, bands, screw stock, bolts, nuts, rivets, washers, lag screws, turnbuckles, bolt ends, steel and wood pulleys, hangers, shafting, drills, drill rods, steel balls, lead pipe, cocks, valves and full line of plumbers' supplies.

The name of the Browning Engineering Co., Cleveland, builder of locomotive cranes, lifting magnets, etc., has been changed to the Browning Co.

Safety Hints

"Safety First" is the slogan of a monthly publication entitled *Safety Hints*, issued by the Portsmouth Steel Co., Portsmouth, O., and distributed free to its thousands of employes. The February number, under the caption of suggestions, contains the following pertinent hints for reducing accidents in the company's plants:

Where traveling cranes are used the weight of the principal heavy articles to be moved should be placed on a card in the crane man's cage in plain view, and the crane man should be instructed to refuse to lift anything if he fears an overload.

Don't go under a crane load of material, unless absolutely necessary.

Don't try to shear small pieces of plate without a dog or tongs.

Don't watch any one using a pneumatic chipper.

Report anything that does not appear safe.

Don't strike tempered steel with a hammer.

Be careful of the long-stroke riveting hammer. If you let the hammer down for a few minutes put the plunger in your pocket.

Keep the ragged burrs broken off your hand tools.

Don't use a hand hammer or sledge with a loose handle.

When knocking off rivet heads, hold an old broom in front of the rivet.

Don't take hold of a staybolt tap until the motor stops.

Don't punch half holes on the power punch.

Don't wear gloves when operating an air motor.

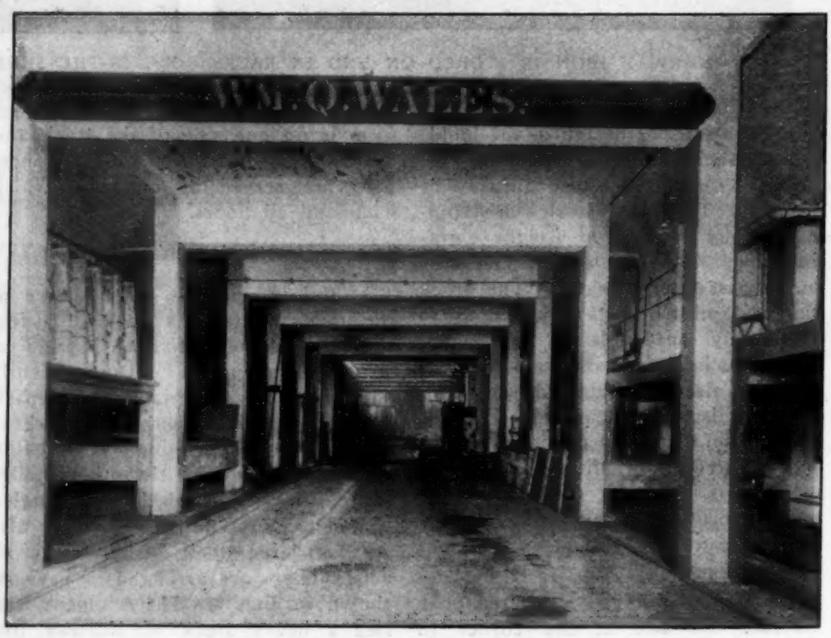


FIG. 4—THE SHIPPING AND RECEIVING DEPARTMENT

Use of Alternators in Parallel

Conditions that must be met to secure satisfactory operation with instructions for setting-up machine

By C A Tupper

With the rapidly increasing use of electric power and its distribution as alternating current among mines, furnaces, mills, fabricating plants, foundries, shops, etc., the operation of generators in parallel has assumed an importance, at many power stations, formerly unknown. This is particularly true where all of the alternators are not in the same plant, but are scattered over a more or less extensive area and connected by a common network of transmission cables. A discussion of the various factors to be considered in installing and operating such units, may, therefore, be of value from the standpoint of power economy.

Attention recently has been directed to a number of notable installations in this country, such as those of the Cleveland-Cliffs Iron Co. and the United States Steel Corporation, at Gary, South Chicago and Joliet, where the parallel operation of large alternators is successfully carried out, and the number of such installations is growing rapidly. Abroad, however, the plan has been carried much further. Throughout Germany, for example, there are numerous systems, including the great Westphalian network, where many entirely independent plants are so connected and run in parallel as to enable the surplus of any one to be fed into the common distribution system and current for an excess load drawn from the same source. Metering, of course, keeps the account correct. In many of the ore mining and iron steel producing districts of this continent the same idea might be carried out, furnishing the basis of co-operation between either related or unrelated interests which would, in many ways, result to their profit.

When alternating current generators are run in parallel there are certain conditions that must be met in order to secure satisfactory operation. These are:

The machines must be in synchronism. That is, the frequency must be the same for each, and the electromotive forces of the different machines must be in phase.

The electromotive forces must be approximately equal.

In order to secure proper division

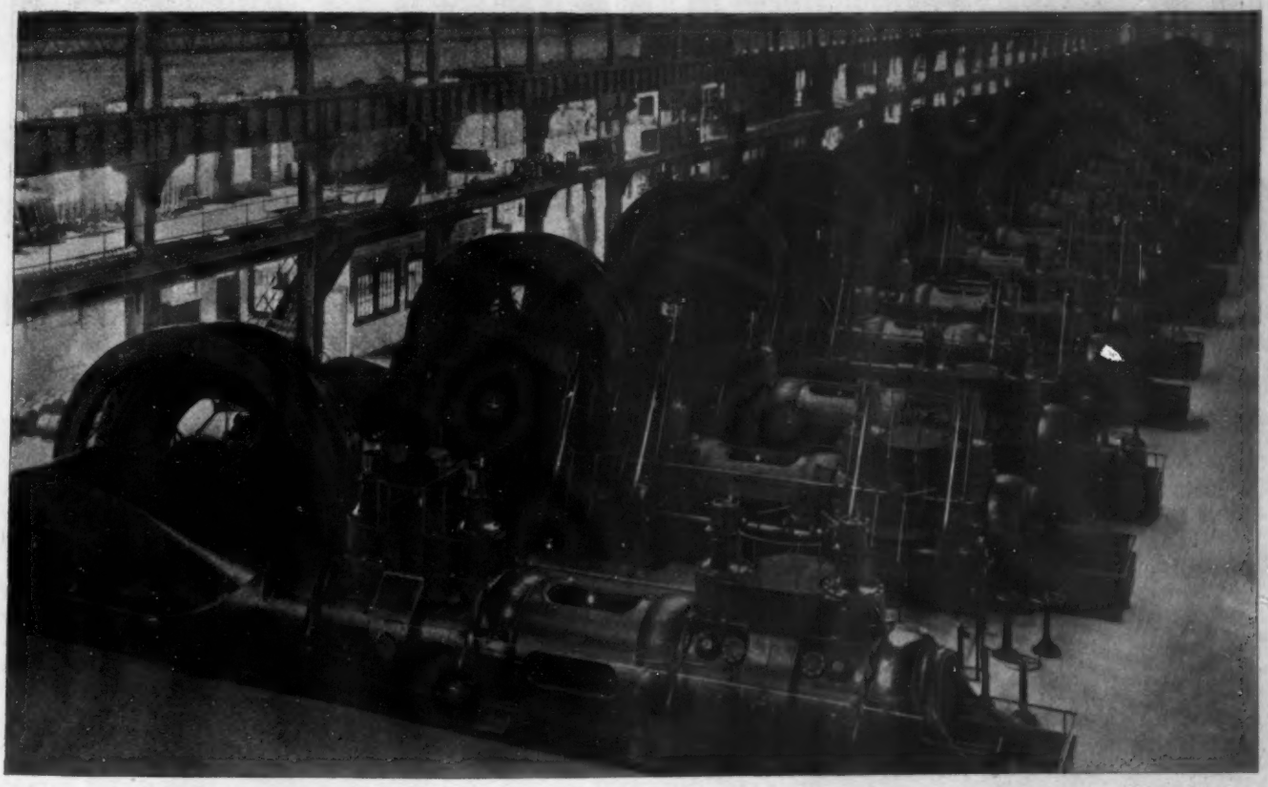


FIG. 1—GAS ENGINE ALTERNATORS AT GARY, OPERATED IN PARALLEL WITH OTHER STATIONS MANY MILES APART

These alternators are in parallel with a gas engine and steam plant at Gary, with gas engine, turbine and steam engine plant at South Chicago and a similar installation at Joliet

of the load. under changes in load conditions, the speed regulator of the prime movers must be alike.

To prevent periodic cross currents between machines, the variations in angular velocity of the prime movers must be kept within certain limits. In water wheel or steam turbine-driven units the angular velocity is uniform, but with reciprocating engine units there may be trouble, due to periodic variation *if the engine flywheels are not heavy enough.*

With belted alternators it is important that the *pulleys be proportioned* so as to make the speeds of the alternators such that they will give exactly the same frequency; if all the machines have the same number of poles, their speeds must be exactly alike. If the pulleys are not of the proper size, there will be excessive belt slippage or exchange of cross currents between the machines, thus causing fluctuations in voltage. This is a simple matter, but frequently overlooked.

With engine or steam turbine-driven alternators, the speed can be varied by adjusting the governor, and there will be no trouble from cross-currents provided the angular velocity of the engine does not vary too much, and the governors act properly.

When alternators are running in parallel, their output (actual power) depends on the amount of power supplied by their prime movers. For example, suppose two engine or steam turbine-driven machines are running in parallel on a certain load and that each is taking half of the load. When the load increases, there is a tendency for the speed to drop slightly, and in order for the governors to act and admit more steam, there must be a slight drop in speed. Now the two alternators must always run in synchronism, or the same speed assuming the number of poles to be alike, and if the drop in speed does not result in an equal increase in the steam admission of each engine or turbine, one alternator will be supplied with more power than the other, and the load will become unequally divided. Changing the field excitation of the slightly loaded machine will not remedy matters (as with direct current generators, where the generators do not have to run in synchronism and have independent speeds). The only effect of changing the field excitation is to make a wattless current circulate between the two alternators, the actual amount of power supplied by each remaining the same. The only way to increase the steam admission is by adjusting the governor, and to secure equal division of load under all conditions, the change in speed for a given change in load must be alike for each unit. When two or more alternators are run in parallel, it is advisable to have an indicating wattmeter on each machine, so that the actual load will be indicated. In case wattmeters are not provided, the load on each should be adjusted so that the sum of the currents, as indicated by the machine ammeters, will be a minimum for a given total current supplied to the line. If the sum of the machine currents is much in excess of the line current, it shows that a wattless current is circulating between the machines.

The condition of synchronism is usually indicated either by incandescent lamps, which is the most simple method, or by a synchronism indicator or synchroscope, the latter now being used in most large installations. A synchroscope gives more accurate indications than lamps and has the additional advantages of showing whether the incoming machine is coming into or going out of phase and how much it is out of phase.

Fig. 9 shows diagrammatically the connections for synchronizing lamps. Two small transformers, *A* and *B*, have their primaries connected to the same phase of each generator. The secondaries, *C* and *D*, are connected in series through a plug or switch, *P*, and lamps, *KL*. Assuming that corresponding terminals of the primaries are connected to corresponding lines on each machine and that the transformers are alike in every

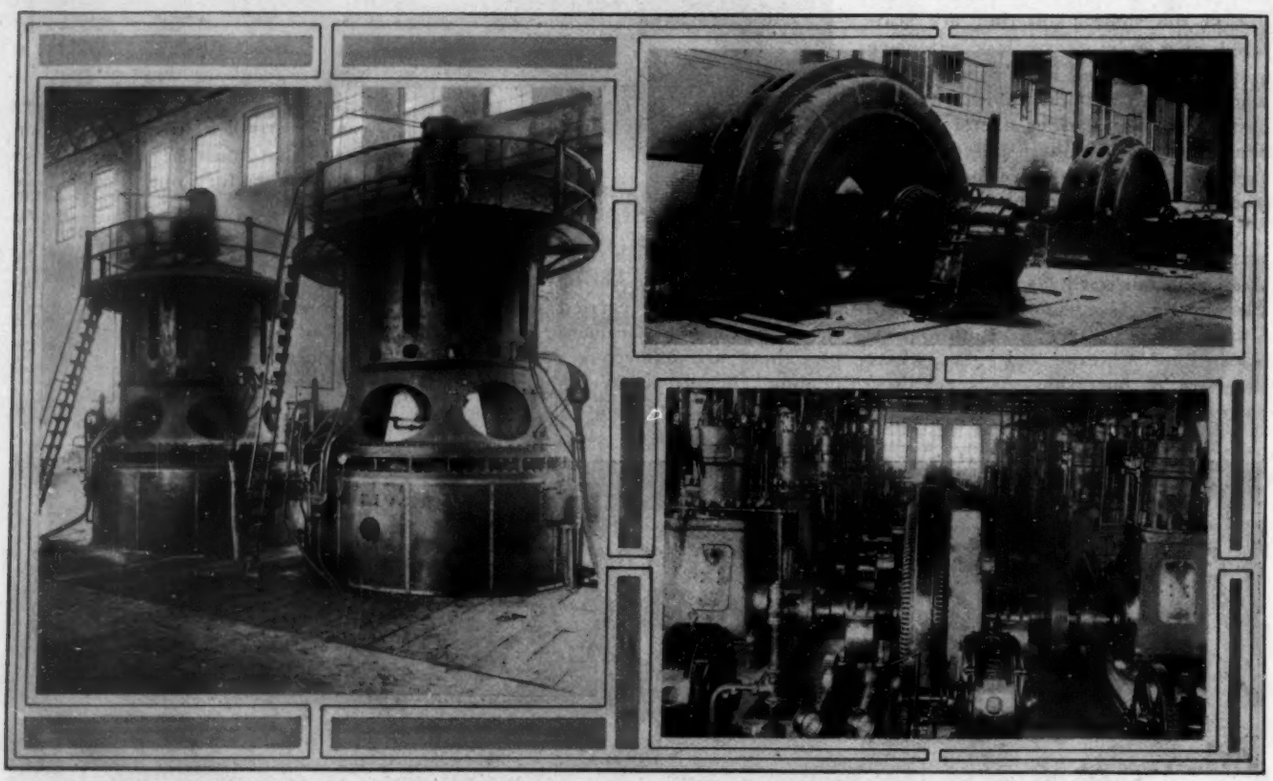


FIG. 2—VERTICAL, TURBINE-DRIVEN ALTERNATORS AT GARY, OPERATED IN PARALLEL WITH GAS DRIVEN ALTERNATORS, FIG. 1

FIG. 3—WATER-WHEEL-DRIVEN ALTERNATORS IN PARALLEL

FIG. 4—ALTERNATORS IN PARALLEL, DRIVEN BY OIL ENGINES

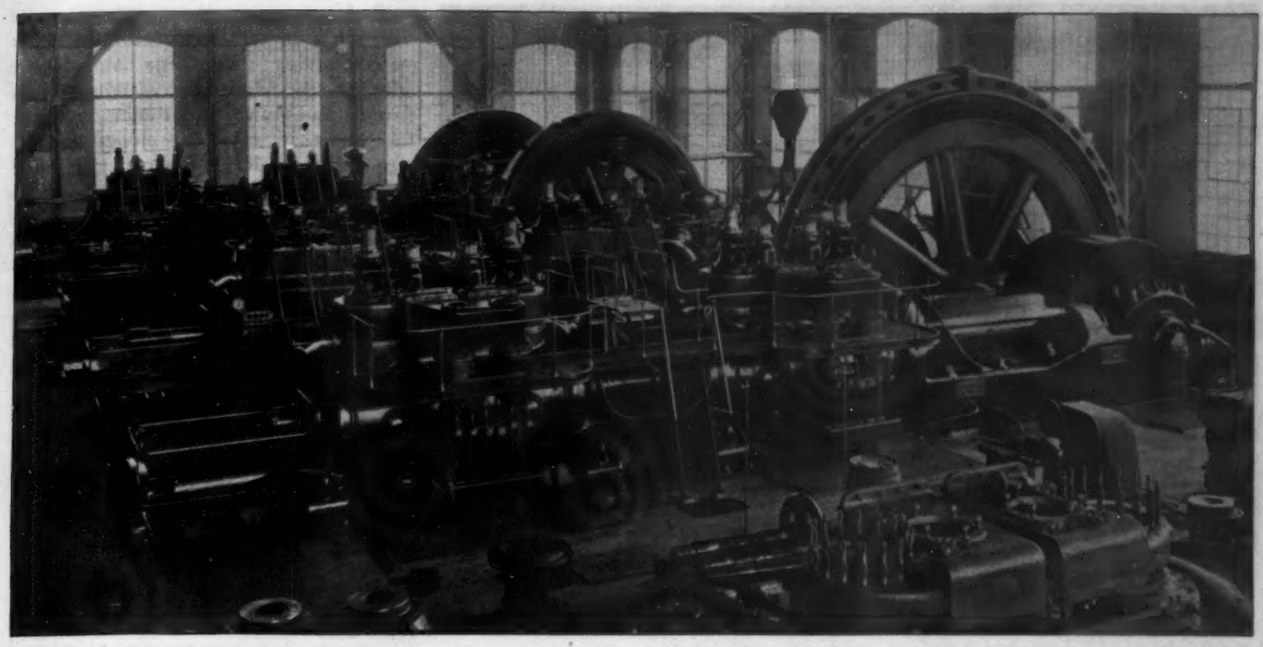


FIG. 5—GAS ENGINE-DRIVEN ALTERNATORS OF PHOENIX HUTTE IN GERMANY, FORMING PART OF A PARALLEL OPERATED SYSTEM CONNECTING POWER PLANTS OF BLAST FURNACES, STEEL MILLS AND MINES

particular, corresponding secondary terminals will, at any given instant, have the same polarity when the two machines are in phase. When plug, *P*, is inserted, secondary terminals of opposite polarity are connected together; hence the two secondary electromotive forces are in series and aid each other in forcing current through lamps, *KL*, which, therefore, are bright at synchronism. It may happen that the transformers are not wound exactly alike or that the connections have become confused; it is always advisable, therefore, to test the connections to make sure that the lamps are light or dark at synchronism. To test connections, as shown in Fig. 9, disconnect *B* from generator *2* and transfer the connections, without changing their relative position, to lines *1* and *3* of generator *1*; *A* and *B* then will be connected to the same lines and if the lamps are bright, they also will be bright at synchronism when *B* is connected to generator *2*, as shown. If dark lamps are preferred, either the primary or secondary connections of one transformer must be reversed.

Another method of testing the connections is to leave the transformer connections as they are and disconnect the main leads at *EF* on generator *2*. Both main generator switches are then closed, thus connecting both transformers, *A* and *B*, to generator *1*. In synchronizing, bright lamps are to be preferred to dark.

When a polyphase alternator is first connected up, it is important to see that all of its phases correspond with those of the bus-bars; if one phase only of a three-phase machine is correct, it does not follow that the other two are correct also. Two of the phases should be tested at the same time by using a pair of auxiliary transformers in addition to

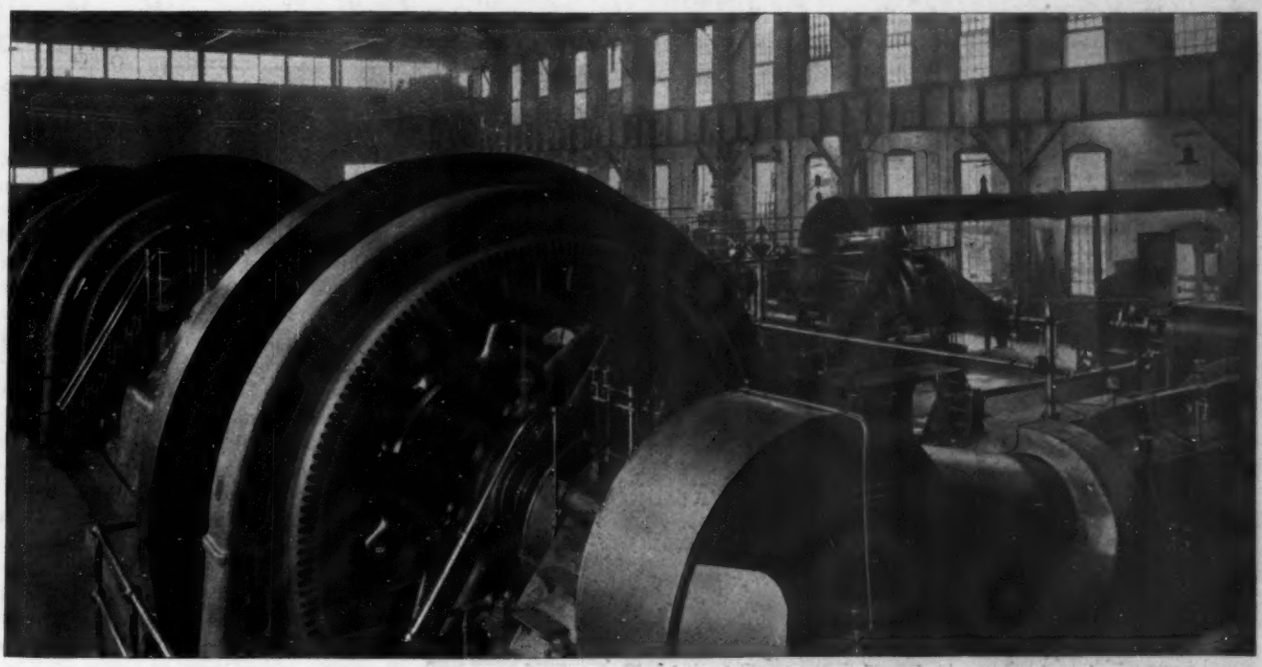


FIG. 6—POWER PLANT OF CARNEGIE STEEL CO., DUQUESNE, PA. TWO OF THE THREE GENERATORS ARE GAS ENGINE DRIVEN

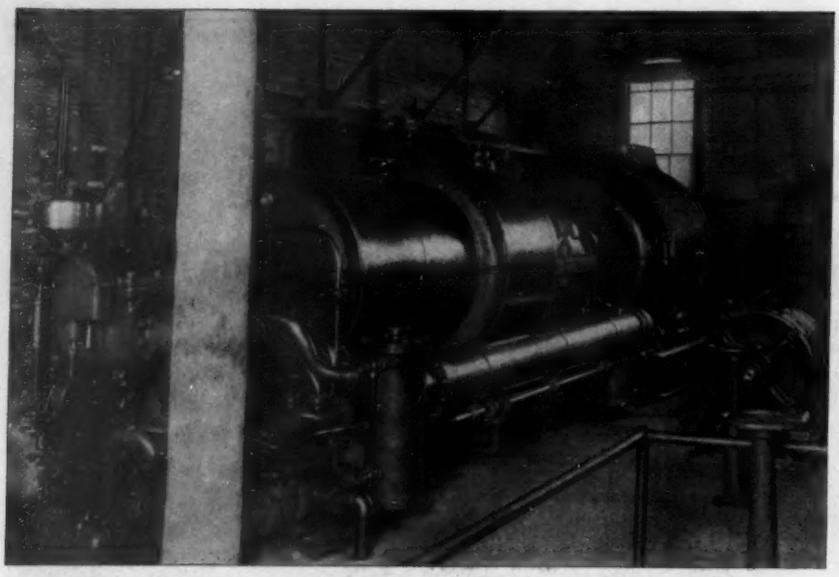


FIG. 7—STEAM TURBINE-DRIVEN ALTERNATOR IN PARALLEL WITH HYDRAULIC POWER PLANT AND A SECOND STEAM PLANT IN THE CLEVELAND CLIFFS IRON CO.'S 33 MILE SYSTEM

the regular synchronizing transformers, *AB*, Fig. 10. Transformer *A* is connected to the bus-bars, and *B* to the generator. A second pair of transformers, *CD*, is connected to one of the other phases, the connections in each case being such that the lamps are bright at synchronism.

The connections should be tested as previously described, to make sure that the polarity of the transformer is correct. With the main switch open and with the generator running at full voltage, both sets of synchronizing lamps should pulsate together. If they do not do so, the leads from the generator are incorrectly connected to the generator terminals and should be interchanged so as to make the lamps pulsate together. After this test has been made, to insure that terminals *a*, *b*, *c* connected to the bus-bars correspond to *a'*, *b'*, *c'* connected to the generator, the temporary transformers, *CD*, can be removed.

Bring each alternator and exciter up to speed and make sure that the oil rings are revolving freely. See that all resistance in both exciter and alternator field rheostats is cut out and that both field and main switches are open. Cut out the resistance in the exciter field and bring the exciter pressure up to normal. Close the field switch of the alternator and have all resistance in so that full voltage will not be generated in the windings. In case the machine is being started for the first time, allow it to run for an hour or two at low voltage and then gradually increase the voltage until it reaches normal; the load can then be thrown on. As the load increases, it will be necessary to cut out some resistance in the field circuit in order to maintain full voltage, and if the load on the alternator is inductive, a larger amount of resistance must be cut out than with non-inductive load. On light loads, comparatively small field excitation is required and it is advisable to run the exciter at rather low voltage and avoid wasting so much power in the field rheostat, provided the exciter voltage is not made low enough to render the operation unstable or cause sparking at the brushes, and the exciter is not used for exciting other alternators.

Precedent to the actual placing of units in parallel operation are, however, the conditions of installation, which it is important to observe.

The location of each generator is usually fixed beforehand by the position it must occupy relative to the prime mover or shafting. There is, therefore, little choice as to location, but it is always desirable to locate alternators, or, in fact, any electrical machinery, in a clean, dry place, where there will be plenty of light and room. Good ventilation is important, since the better the ventilation the lower will be the operating temperatures of the machine. There should not be any combustible material near the alternator and the location should provide for sufficient headroom to permit taking the machine apart if necessary. The best plan for handling the parts and putting them in position will depend largely on the size of machine, location in which it is to be placed, and handling facilities available. If a traveling crane is at hand, the work is comparatively simple, but if temporary hoisting appliances, blocking,

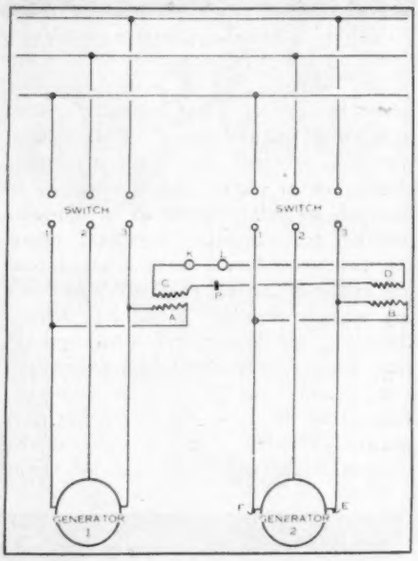


FIG. 9—DIAGRAM OF CONNECTIONS FOR SYNCHRONIZING LAMPS

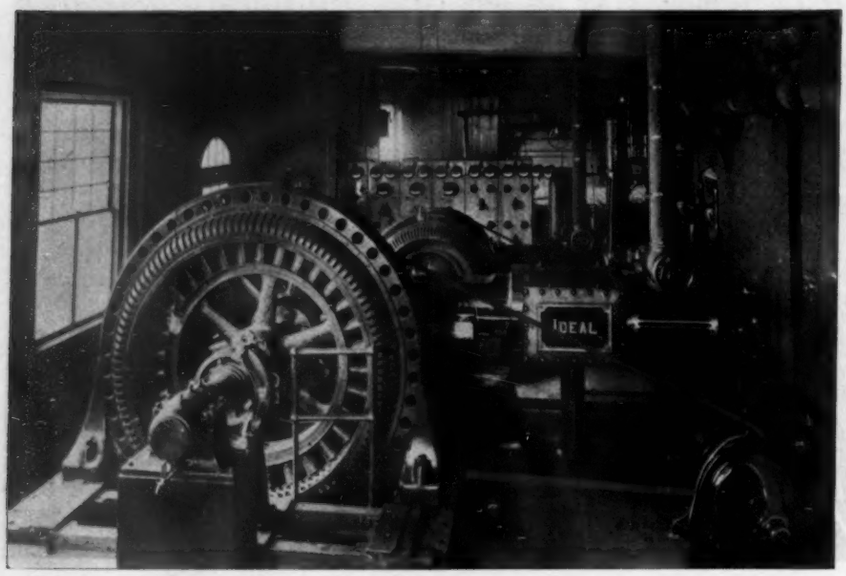


FIG. 8—ALTERNATORS IN PARALLEL, DRIVEN BY HIGH SPEED ENGINES

etc., are depended on, the method of handling must be suited to the conditions under which the machine is installed. Where no crane is available, there should be provided a horse or derrick, made of heavy timbers, and of sufficient size to hoist the parts of the machine into place by means of a chain block.

The smaller belted machines, Fig. 11, and those of the water-wheel type usually are shipped completely assembled, with the stator yoke and bearings fastened to the base. In many cases, the stator is separate from the base and in machines of large diameter, particularly those of the engine type, it may be in two parts, being split horizontally.

The foundation on which an alternator rests should be firm and substantial, in order to prevent vibration and secure smooth running. Small, belted machines below 100 kilowatts

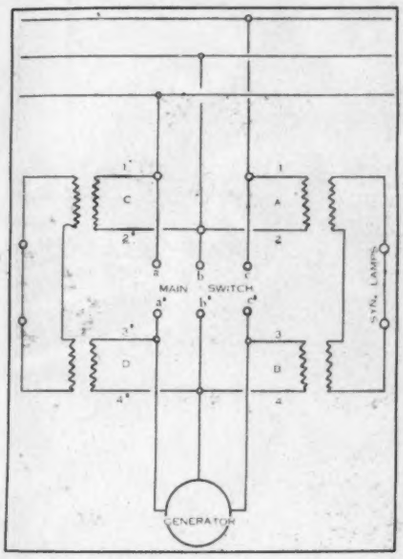


FIG. 10—DIAGRAM OF CONNECTIONS FOR TESTING POLYPHASE ALTERNATOR

can, if necessary, be set on heavy timber supports, but a concrete or brick foundation is to be recommended whenever possible; all machines above 100 kilowatts must be provided with concrete, brick, or masonry foundation, concrete being the most suitable. Concrete for this purpose can be made in the following proportions: Sharp sand, 2 parts; broken stone, 4 to 5 parts, and Portland cement, 1 part; all parts are by bulk.

The foundation should be heavy enough to secure freedom from vibration and, in building it, provision should be made for foundation bolts to hold the base, rails, or sole plates of the machines. In making the foundation, iron pipes can be placed in the approximate locations that the foundation bolts will occupy, pipe having an inside diameter at least 2 inches larger than the foundation bolts being used, to allow adjustment. Pockets also should be arranged in the foundation to give access to the anchor plates and bottom nuts on the foundation bolts. After the alternator has been permanently located, thin cement should be run into the pipes, thus fixing the bolts accurately in position. Foundation bolts should be located by templates made from outline prints of the machines. The top of the foundation should be leveled off as accurately as possible and cement allowed sufficient time to set before the machine is placed in position.

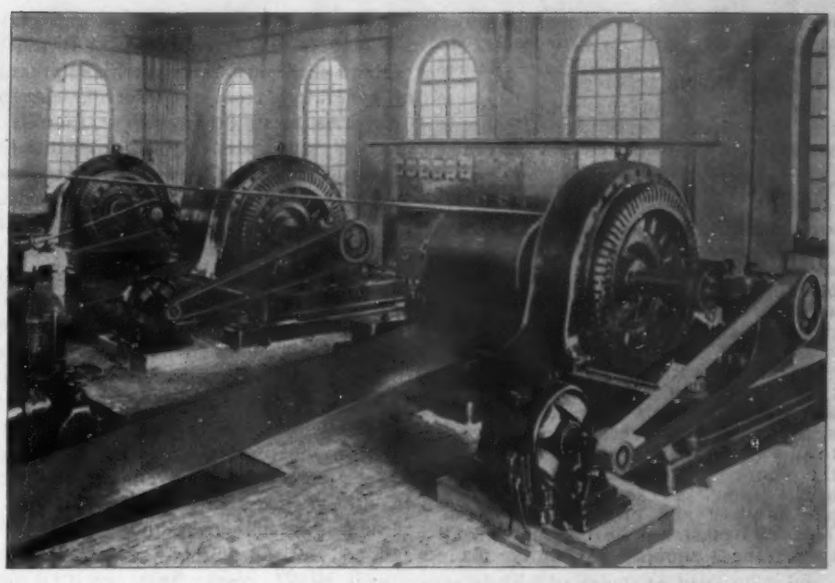


FIG. 11—BELTED ALTERNATORS IN PARALLEL AT ELECTROLYTIC PLANT

Installing an Alternator

With engine type alternators, Fig. 8, the stator yoke either rests on an extension of the engine bed, as with some of the smaller machines, coupled to high speed engines, or on sole plates on suitable foundations. The stator sole plates for the large machines usually are made in two parts, the lower one being bolted to the foundation, while the upper plate is adjustable to facilitate centering the stator with respect to the field. Following are the steps to be taken:

Locate the sole plates temporarily in position and support them on iron wedges to allow for further adjustment.

Place the lower half of the stator in position and level it approximately by means of the leveling screws in the upper part of the sole plate. In case the stator is arranged to shift sideways on the base or sole plates, set the stator to one side, so that it will be away from the rotor when the latter is placed in position.

Locate revolving field and engine shaft in bearings, observing the same precautions as given under belted machines. In case the engine shaft has

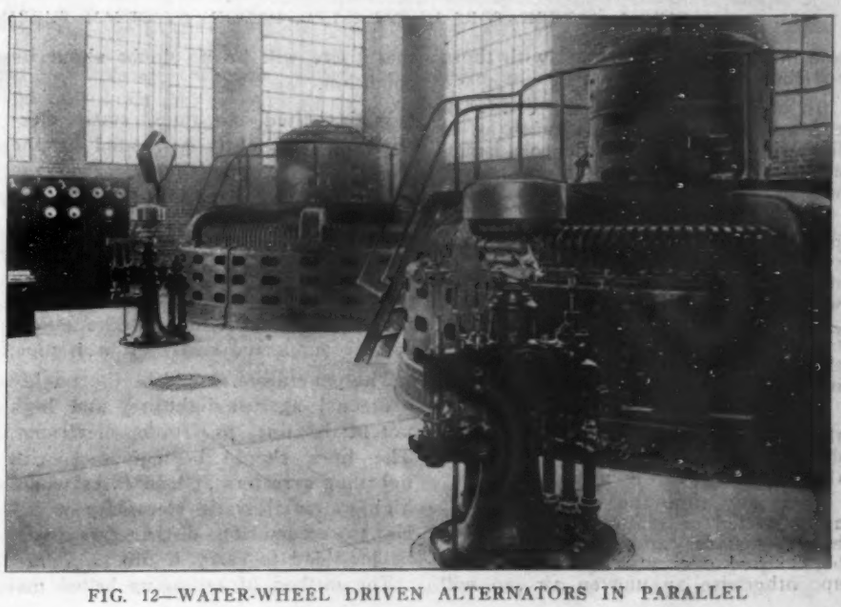


FIG. 12—WATER-WHEEL DRIVEN ALTERNATORS IN PARALLEL

not been pressed into the rotor spider at the factory and it is necessary to do this work on the ground, an expert machinist should be employed.

Place the top of the yoke in position, first making sure that all planed surfaces are perfectly clean. Carefully center the stator with respect to the field by means of the adjusting screws in the feet and sole plates and measure the air-gap between stator face and pole pieces at a number of points around the circumference; it is important to have the air-gap uniform, as otherwise the frame will be subjected to an unbalanced magnetic pull, causing bad operation.

In large water-wheel and engine-type alternators, Figs. 3, 6 and 14, where the stator is split, it is usually necessary for convenience in shipping to disconnect and remove a few of the stator coils at the two partings in the frame. These must be carefully put in place and properly connected. The coils must not be bruised and all connections should be neatly made and insulated to correspond with those for the other coils.

In aligning the yoke, the center of the armature laminations must be in line with the center of the pole laminations; if they are not in line, there will be a side thrust on the shaft.

After the yoke has been finally adjusted, shims are to be inserted between the upper and lower parts of the sole plates so as to take the weight off the leveling screws. Drill and tap holes in the lower sole-plate to receive the holding-down bolts for the stator, and bolt the latter securely in place.

Grout-in the sole-plate and, after the cement has set, tighten the foundation bolts and carefully check over the alignment of the machine.

If at any time the engine bearings are adjusted or realigned, the air-gap between stator and rotor must also be checked over and the stator lined up; otherwise an uneven air-gap will result or the rotor may even rub on the stator.

Most engineers favor the insulation of generators from the ground, wherever it is feasible. Such insulation is generally provided by a substantial wooden frame or wooden stringers under the rails, the wood being well filled and varnished to prevent absorption of moisture. This is practicable with small, belted generators, but with heavy machines or those direct-connected to steam engines or water-wheels complete insulation from the ground is practically impossible and it is better to ground the frame positively by means of a heavy copper wire connecting the frame with a water pipe or other convenient ground. In other words, the frame of a machine should either be thoroughly insulated or thoroughly grounded, so that there will be no doubt about its condition.

With belted machines, static electricity is frequently generated by the belt, thus charging the frame of the machine if the latter is thoroughly insulated from ground. This static electricity is generally removed by arranging a comb or series of metal points close under the belt and connecting them to ground. The points can be supported easily on iron pipe.

The generators should be thoroughly protected against lightning and high potentials due to static electricity. The lines should be equipped with lightning arresters and, in cases where high potential static electricity is liable to accumulate, dischargers should be provided to carry it off.

The method of setting-up belted machines is as follows:

The rails should be placed in position, approximately leveled, and wedged up so that the weight of the machine will be distributed evenly.

If the alternator is small and comes completely assembled, it can now be set on the rails, carefully leveled, and lined up with the driving pulley.

If the machine is of large size and shipped in two or more parts, place the base on the rails and set the stator in position, first making sure that the planed surfaces on the base and feet of the stator are perfectly clean and oiled to prevent rust. Most of the larger belted machines are arranged so that the stator can be shifted to one side to give access to the field and armature coils, and when the stator is first set on the base it is advisable to locate it so that it will be to one side of the field when the latter is placed in position. All bearing surfaces should be thoroughly cleaned before the shaft is placed in the bearings; if there are any rough or rusty spots on the journals, they should be removed with crocus cloth; the oil wells should be clean. When placing the rotor in position, the oil rings should be watched carefully to see that they do not get jammed and bent out of shape; after the rotor has been placed, the caps of the bearing pedestals should be put in position and bolted down firmly. The stator can now be slid into position over the rotor and bolted in place; if there are any dowel pins in the feet of the stator, they should be put in place before the cap bolts are screwed down. The bearings should be filled with a good quality of mineral oil to the proper height, as indicated by the oil gage.

Put the pulley on the shaft, and line up the whole machine with the driving pulley. If possible, run the machine with a rather slack belt and adjust the alignment while running, so that the belt runs on the center of the pulley and allows the rotor to oscillate freely in its bearings.

Tighten the foundation bolts and

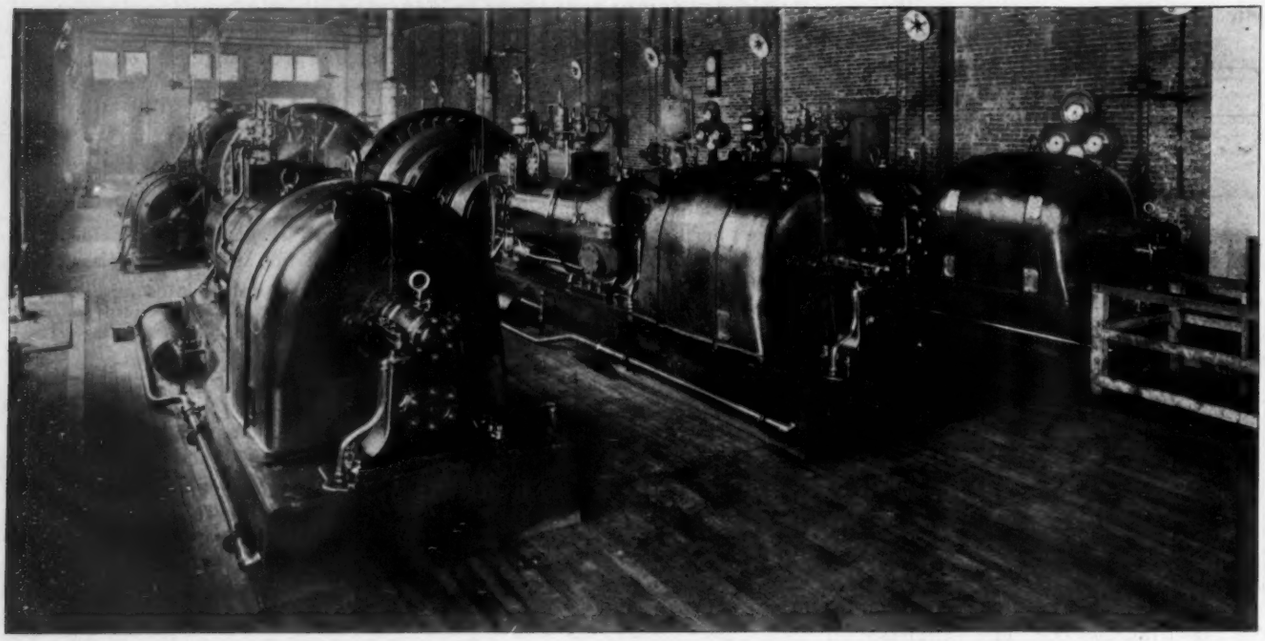


FIG. 13—ALTERNATORS IN PARALLEL, DRIVEN BY STEAM TURBINES AND STEAM ENGINES

grout the rails by making a thin, easy-flowing mixture of one part of Portland cement and one part of sand, together with sufficient water, and pouring it in under and around the rails; small clay dams can be used to keep the thin cement in place until it hardens. When the cement is partly set, the surplus can be removed and the joint under the rails smoothed up.

The foregoing regarding belted machines applies for the most part to water-wheel alternators also, except that the latter have no rails, and the base is set directly on the foundation. In this case the machine must be lined up accurately with reference to the water-wheel so that the halves of the flange coupling will fit exactly. After lining-up by means of wedges under the base, the foundation bolts should be tightened and the base well grouted-in. Use plenty of wedges and place them under both inside and outside edges of the base so as to give a firm and even support. In some cases, where water-wheel alternators are of large diameter and run at low speed, no base is provided. The stator and bearing pedestals rest on sole plates bolted to the foundation in the same manner as described for engine type alternators.

With small alternators, the collector rings are mounted in place on the shaft and connected to the field windings. On large machines, especially engine-type, where there is no shaft, the rings are usually furnished by manufacturers separately, and in large machines both hub and rings are split so that they can be put in place after the rotor has been mounted in its bearings. The collector rings should be fixed securely in position so as to run true, and rings connected to leads from the field winding, making sure that all contacts are clean and bolted up tight.

With large engine-type alternators and also with some of the larger water-wheel machines, the brush holders are supported by a stand bolted to the base or to a bridge fastened to the sole plates. On smaller machines, the brush holder studs are supported by the bearing pedestal. All insulating bushings and washers on the brush studs should be in place and the studs bolted up tight; also, the brush holder stand, if any, should be firmly bolted to the bed or bridge and should be properly lined up with the collector rings.

The brushes should be carefully fitted to the collector rings, first using coarse sand or garnet paper and finishing with fine sand paper. While shaping the brushes, the paper should be held well down on the rings so as not to wear away the edge of the brush. See that the whole surface of the brush makes contact with the ring and that the finger presses squarely on the brush. The pressure should be adjusted by changing the position of the tension spring on the arm and should be such as to give a good contact on the ring; a greater pressure improves the contact very little and only causes excessive friction loss, wear and heating of the brushes and rings. Good judgment and careful attention will soon show the best pressure to be used.

The oil wells should be thoroughly cleaned and filled with a good grade of mineral oil; the wells should be filled to such height as will insure that the rings carry up oil. The oil well covers should be so placed that no foreign matter can drop into the bearings. When the machine is first started, it is advisable to draw off the oil at the end of each day's run and fill up with fresh oil until it is certain that all the particles of foreign matter are out of the bearings. The oil drawn off can be filtered and used over again. When a machine is first started, it is advisable to run slow for an hour and watch the bearings closely before running up to full speed.

In all wiring, special attention must be paid to the mechanical execution of the work and special precautions are necessary with the wiring of high pressure alternators. In running the wires the requirements of the underwriters should be observed and special care should be taken to have all joints secure and thoroughly insulated. All wires should be of sufficient cross-section to carry at least 25 per cent overload without overheating. For wires larger than No. 2 B. & S. it is advisable to use strained cable, as it is much easier to run than solid wire.

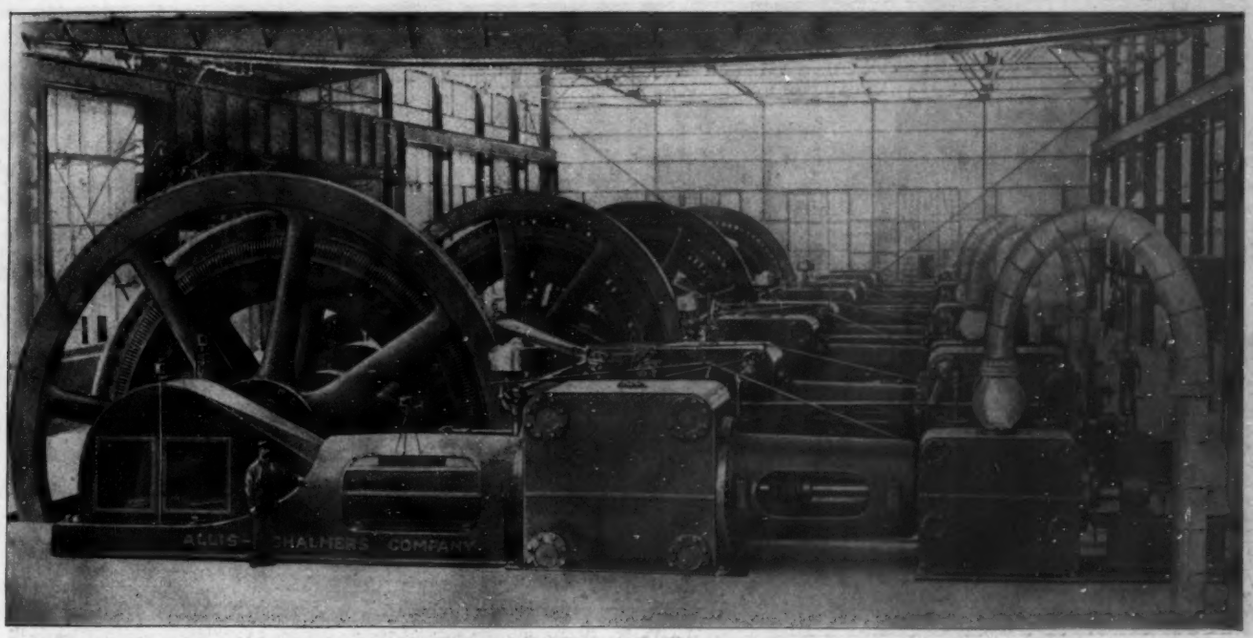


FIG. 14—ENGINE-DRIVEN ALTERNATORS IN PARALLEL AT SMELTER PLANT

On account of not having a commutator, alternators are on the whole easier to keep in good running order than direct current machines. At the same time they must be properly attended to. It must be remembered that they frequently generate much higher pressure than direct current machines and there is all the more necessity for keeping them perfectly clean. No dirt, copper or carbon dust should be allowed to accumulate on or near the windings, and in plants sufficiently large to warrant the ex-

pense, it is advisable to install a compressed air system so that all dirt can be blown out of the corners not otherwise easily reached. It is also advisable to give the armature coils and connections a coat of insulating varnish occasionally.

Keep the collector rings lubricated with a small quantity of vaseline, applied with a cloth and see that the brushes make good contact with the rings.

Never open the field circuit suddenly while current is flowing, and both main and field switches should be open when the machine is running.

Never throw machines in parallel when they are out of synchronism, as the excessive rush of current throws heavy strains on the engines and generators and may cause considerable damage.

Remember that the alternators are designed for the voltage indicated on the name plate. They must not be expected to give voltage considerably above normal with satisfactory performance of either exciter or alternator. This point is mentioned here *because frequent attempts to raise the voltage an excessive amount have resulted in poor operation* through no fault of either exciter or alternator. Furthermore, the rated current output should not be continuously exceeded. Check the air-gap between stator and rotor now and then, and, if it is found to be uneven, realign the machine. This applies particularly to engine-type generators. See that all bolts and nuts are kept tight. Electrical machinery should receive as much attention in this respect as steam engines. It is advisable to keep at least one of each size of armature coil on hand in case repairs are necessary, and extra sets of brushes should be kept for both alternators and exciters.

If a machine has been exposed to low temperature, it should not be unpacked until it has reached the same temperature as that of the room, otherwise it will sweat. After the alternator has been set up, it should be dried out by short-circuiting the armature terminals and running the machines with low field excitation sufficient to circulate in the armature current about 25 per cent greater than normal full load current. An instrument should be inserted to indicate the current, and the machine run until it has become thoroughly warmed up and all moisture expelled.

When a belted alternator is to be thrown in parallel with another machine, first bring the incoming generator up to speed and adjust the speed until the beats of the synchronizing lamps become very slow, say one beat in two or three seconds, or until the pointer of the synchroscope is moving very slowly. Close the main switch when the lamps indicate synchronism (light or dark, depending on the connection), or when the pointer of the synchroscope is over the central point or slightly ahead of it. Adjust the field excitation and see that the alternator is supplied with enough power to make it carry its share of the load. In case a number of belted alternators are driven from a common line shaft, the belt of the incoming machine should be slackened, thus introducing enough slip to allow the machine to be synchronized. After the alternator is in step, the belt can be tightened and the load gradually applied.

With engine-driven alternators the incoming machine should be given only a small amount of steam until after it is synchronized. The load can then be taken up by admitting more steam. In large plants the engine or turbine governor is usually arranged so that it can be controlled electrically from the switchboard and the steam admission can be regulated at the throttle. Water-wheel governors also are frequently provided with an electrical control device; if not, the gate opening must be controlled by hand to synchronize the machine and adjust the load.

When machines are operated in parallel and one is to be shut down, first reduce the load by throttling the engine or slackening the belt. Then open the main switch. Cut in resistance in the field of the alternator to reduce field current, and open the field switch.

When a machine is run by itself and it is to be shut down, first cut in resistance in the field of the alternator, thus lowering the voltage. Then open the main switch and finally the field switch of the alternator. The alternator field circuit should not be opened when full current is flowing, because the high induced electromotive force caused thereby may be sufficient to break down the field insulation. With most of the large machines a grid resistance is connected to the field switch so that in case the latter is opened, the resistance is first connected across the field circuit, thus forming a path through which the induced current can flow and prevent any abnormal rise in electromotive force.

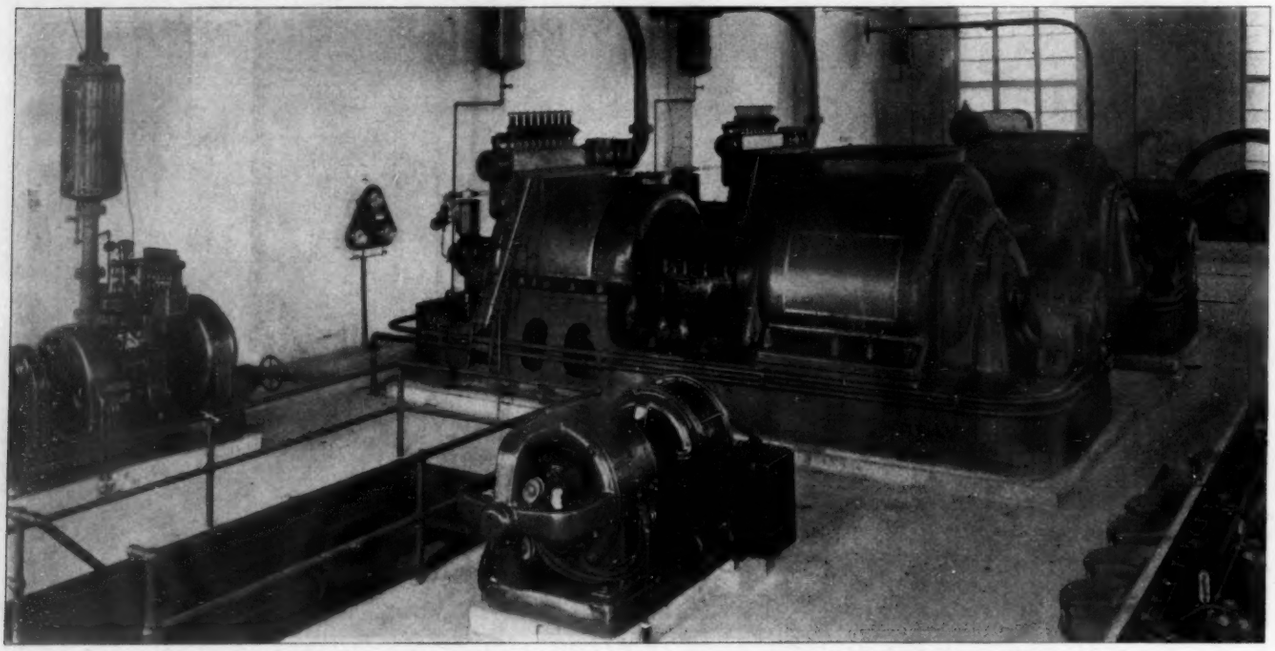


FIG. 15—CURTIS TURBINE-DRIVEN ALTERNATORS IN PARALLEL AT PLANT OF THE ROCHESTER & PITTSBURGH COAL & IRON CO., PUNXSUTAWNEY, PA.

Machines for Cold-Sawing Axles

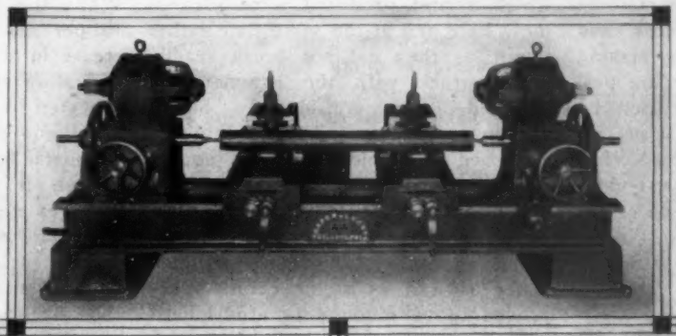
New types with individual high speed motor drive and compressed air work holders

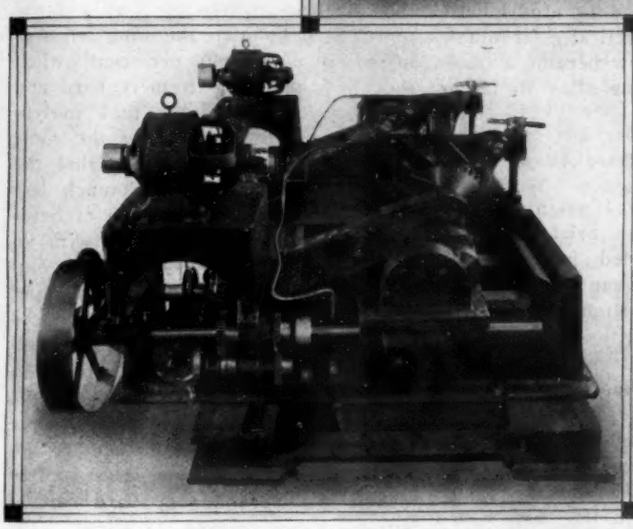
Recent advances in the design of heavy duty cold-sawing and cutting-off machines have resulted in the development of tools with sufficient power to advance the saw blade at the rate of 6 inches per minute when working on axles or mild steel bars up to 20 inches in diameter. Such heavy feeds, coupled with high cutting speeds, have necessitated great care in the distribution of metal in the frame of the machine to insure sufficient stiffness and have also required the adoption of special analysis steel for gears and shafts. In addition, attention has been given to the work clamping devices and other auxiliary fittings. New tools embodying these ideas recently have been developed by the Espen-Lucas Machine Works, Philadelphia. A rapid production, duplex machine for sawing axles is illustrated in Fig. 2. It is equipped with two cutting heads so that both ends of the axle may be sawed off at one time. Special inserted-tooth saw blades, 32 inches in diameter are used and the machine has sufficient capacity to trim from 12 to 15, 9-inch axles per hour. The feed and driving mechanisms are sufficiently powerful to advance the saw blades through the work at the rate of 6 inches per minute. The life of a given saw blade is limited only by the nature of the material that is being cut and the endurance of the high speed steel used in the inserted cutters.

The bed plate of the machine and table are of heavy cast iron, cored in box sections. The saw carriages are wide and long and have ample bearings on the base.

The saw blades are driven through a powerful compound gear mechanism, consisting of a steel worm and bronze worm wheel together with steel spur gears. The saw blades are bolted directly to the driving gears, which are forged integrally with their spindles. This form of drive is very rigid and there is practically no lost motion between the saws and the gears. The spindle bearings extend the entire width of the saw carriages, thus affording a rigid support for the shafts and gears. The thrusts of the driving worm and other rapidly revolving parts are taken up by roller bearings. The shaft and spindle bearings are bushed with bronze. The gears and spindles are turned from high carbon, hammered steel forgings. Each saw blade is driven independently by a 15-horsepower electric motor, which is bolted to a table that fits over the feed gears.

The machine has a positive geared feed which may be varied to suit the work at hand and the depth of the cut is regulated by an automatic stop. This, together with an automatic power return, leaves the operator free to give his whole attention to feeding axles to the machine and removing them when finished. The complete machine weighs approximately 30,000 pounds. As a companion to the cutting-off machine, the Espen-Lucas Machine Works has developed a double end centering machine, which centers and drills the ends of the axles after they have been cut to the required length. It will handle axles up to 7 inches in diameter and 8 feet long. The frame consists of double I-section of heavy cast iron securely tied together by cross members. Each spinde is driven independently by a two-horsepower motor. One driving head is stationary and the other is adjustable to fit axles of varying lengths. Two cradles equipped with rollers are provided for bringing the axles to an approximate center and heavy clamps hold the piece while it is being drilled. The machine weighs about 11,000





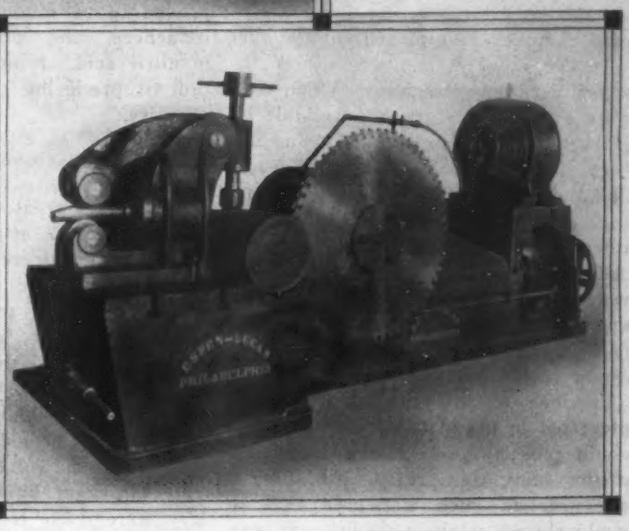


FIG. 1—MOTOR-DRIVEN AXLE CENTERING MACHINE

FIG. 2—HEAVY DUTY DUPLEX AXLE SAWING MACHINE

FIG. 3—SIXTY-INCH COLD SAWING MACHINE

pounds. The machine shown in Fig. 3 is designed for sawing square or round bars up to 20 inches in diameter at the rate of 6 inches per minute. The saw blade is 60 inches in diameter. It is bolted to the spindle and is driven through a phosphor-bronze worm wheel and crucible steel worm running in oil. The spindle bearing extends the entire width of the carriage. Any type of saw blade with either solid or inserted teeth may be used.

The feed is obtained from a geared friction plate controlled by an automatic lock-nut lever. By changing the position of this lever the cutting speed may be varied while the machine is in operation. The quick return of the saw carriage is controlled by the same lever. An automatic stop is provided for regulating the depth of the cut. Ordinary screw clamps or clamps operated by compressed air are fitted to the machine, depending on the kind of work to be handled. For handling stock rapidly, where multiple cuts are to be made, the machine is equipped with a stock feed attachment which will take bars of any length up to 20 feet. The usual oil drip pan has been eliminated and a reservoir in the foundation substituted. The machine is belt-driven by a 35-horsepower motor and weighs about 50,000 pounds.

A New Alloy for Edge Tools

By Elwood Haynes

In 1880, the writer made some experiments with a view to determining the effect of tungsten on iron and steel, and he succeeded in making alloys of iron containing varying percentages of carbon and tungsten by melting pure wrought iron wire cuttings in a small crucible with Wolframite. Only sufficient powdered charcoal was introduced to reduce the tungsten to the metallic state. After the steel was thoroughly melted, it was allowed to cool in the crucible, and the fused lump or ingot was afterward removed and forged into a bar.

An excess of carbon was nearly always present in these alloys, which was taken up from the graphite crucible in which the fusions were made. Fusions were afterward made in a lime crucible, and an alloy consisting of pure iron and nearly pure tungsten was procured. This alloy showed but little elasticity, but was quite tough, and was readily drawn into wire. The tensile strength of the alloy was a little more than 100,000 pounds per square inch.

Previous to this time I had been interested in producing an alloy which would take a good cutting edge and at the same time resist atmospheric influences to such a degree that it would always retain its polish. It was not until about June 15, 1899, that I fully succeeded in making an alloy that would resist atmospheric influences.

Nickel and Chromium Alloy

This alloy was composed of nickel and chromium, and was obtained by simultaneously reducing the oxides of these metals by means of aluminum. The alloy was not very hard, and could be filed rather readily. It was, however, practically immune to atmospheric influences and insoluble in nitric acid.

Soon afterward in a similar manner I obtained an alloy of cobalt and chromium. The little pellets of metal which I first produced were surprisingly hard and at the same time rather tough, as they did not break readily when struck with the hammer, but flattened down considerably before showing fracture. They could be scratched by a file, but could not be filed to a workable extent.

I brightened some of these pellets on a small carborundum stone and found that they showed a brilliant luster as well as a fine color. They proved to be immune to atmospheric influences, and practically insoluble in nitric acid. It now became a question of producing the alloy in larger quantity.

Cobalt-Chromium Alloy

A few years later I again took up the alloy, and after brief series of experiments succeeded in producing it in considerable quantity. I found that it could be melted in a special crucible without being contaminated with carbon, and that when the metal was cast from the fluid state the bars thus formed could be forged into various forms, provided sufficient care was used in working them. Table knives, pocket knives and other cutlery were made from the bars, which retained their luster under all sorts of exposure; in fact, this alloy rivals gold and platinum in this particular.

The next step was to produce an alloy of sufficient hardness and elasticity to be used for cutting other metals. Small quantities of carbon were introduced, which increased the hardness of the alloy to a considerable extent, also small amounts of molybdenum, tungsten and other metals were added to it. It was found, however, that a considerable amount of these metals must be added in order to produce a marked effect upon the alloy. For example, 5 per cent of tungsten showed but little effect upon a cobalt-chromium alloy, containing 15 per cent chromium and 80 per cent cobalt. When the tungsten was increased to 10 per cent, however, a decided increase in the hardness and density of the alloy was apparent. When the tungsten was raised to 15 per cent a still more decided effect was shown, the metal becoming harder and denser, though it could still be forced to some extent.

An alloy containing 20 per cent tungsten could be forged to a slight extent, but showed fairly good cutting qualities when used as a lathe tool. Step by step the tungsten was increased up to 40 per cent, when the alloy became extremely hard and brittle. It was found that molybdenum produced practically the same effect as tungsten, excepting that the molybdenum required was much less for producing a given degree of hardness. Starting, for example, with an alloy containing 15 per cent of chromium and 80 per cent of cobalt, a 5 per cent addition of molybdenum produced a marked effect, increasing the hardness and elasticity of the alloy to a considerable degree.

Starting with an alloy of 25 per cent chromium and 65 per cent cobalt, the addition of 10 per cent molybdenum produces a very hard composition, which makes excellent lathe tool metal. Numerous combinations have been made, some of which contain both tungsten and molybdenum as well as chromium and cobalt, and the alloys are constantly being improved from time to time.

Properties of Stellite

If a polished piece of stellite is heated in the air, it remains bright until a temperature of about 800 to 900 degrees Fahr. is reached, when it assumes a pale yellow color, which gradually changes to amber, then into brown, followed by deep peacock blue, and finally a dark, blue black. The changes in color are much the same

as those noted in a polished bar of steel, though the temperatures at which the stellite assumes the colors, are much higher. Moreover, after the stellite has cooled, it assumes its former hardness, so that the cutting edge of a tool made of this material remains the same after being exposed to a bright red heat, while it is well known that all steels lose, to a considerable extent, in hardness after being heated to redness and allowed to cool slowly in the air.

Furthermore, the stellite lathe tools remain quite hard even when red hot, and a shaving has been cut from a common wire nail by means of a stellite tool, which had been previously heated to bright redness in a furnace and remained red hot while the cutting was done. This permanent hardness is characteristic of all stellite machine

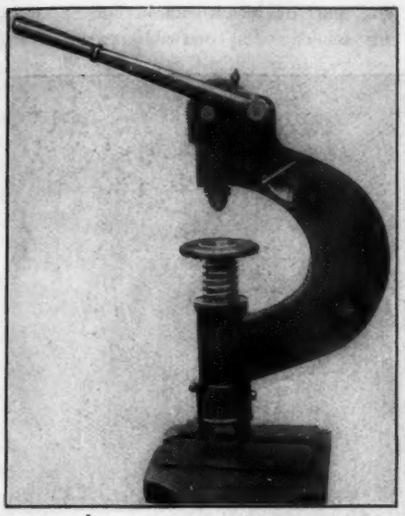


FIG. 1—DERIHON HARDNESS TESTING MACHINE

tools, and it is this property that gives them their distinctive value, when taking cuts at high speed.

The following results have been reported by a prominent manufacturer from tests of high speed steel and stellite.

	Ft. per min.
Superior high speed steel on phosphor bronze	125
Stellite on phosphor bronze	900
High speed steel on tool steel	80
Stellite on tool steel	133
Steel on seamless tubing	100
Stellite on seamless tubing	400
Steel on cast iron	100
Stellite on cast iron	200

It will be noted that the speeds of some of the above tests with stellite tools are exceedingly high, and it must not be supposed that it is advantageous to work a tool regularly at these high speeds. In many instances, however, a stellite tool will remove metal under a given depth of cut fully twice as fast as it can be removed by a steel tool under the same conditions. Thus far lathe tools particularly have been recommended for comparatively light depths of cut, ¼ inch or under. As this depth, however, is sufficient for many classes of work, the only method of removing the material rapidly is by taking the cut at high speed.

Testing Machine

A portable machine for testing the hardness of metals by the Brinell method has recently been placed on the market by H. A. Elliott, 507 Majestic building, Detroit. The hardness is measured by making an impression in the sample with a 10-millimeter ball under a pressure of 3,000 kilograms and comparing it with a standard impression made under similar conditions.

Fig. 1 shows the machine ready for the test with the lever raised and resting on the shaft. The sample is placed on the table which is then screwed up until the piece is in contact with the ball and force is slowly applied to the lever until 3,000 kilograms are registered on the small manometer in the frame. Under normal conditions it is necessary to move the lever about 45 degrees. The diameter of the impression made in the sample is measured and this figure compared with the diameter of the standard impression gives the relative hardness.

The pressure is measured by the deflection of the frame which is so shaped as to have a maximum elasticity. The distortion of frame is proportional to the force applied to the lever and is indicated by the manometer which is calibrated to read in kilograms. The maximum deflection does not exced 1.5 millimeters. The frame is made of air-hardened, chrome-nickel steel having an elastic limit of 242,000 pounds per square inch.

Through long continued use or accident, the frame may assume a permanent set which would result in inaccurate pressure readings. In this case, the necessary adjustment may be made by making a standard impression in the standard piece and simultaneously bringing the needle of the manometer over the 3,000 mark by means of a small adjusting screw, the machine is so constructed that adjustments of this kind are rarely necessary.

Book Review

Welding, by Richard N. Hart; 210 pages, illustrated, published by the McGraw-Hill Book Co., New York City, and furnished by THE IRON TRADE REVIEW for $2.50 net.

The second edition of this well-known work has been made necessary by the rapid progress of the last three years in both apparatus and methods of welding. This is particularly true of the arc welding and oxy-acetylene systems. Arc welding, which seemed limited in its possibilities a few years ago, has developed to a surprising degree. Keen competition between the different systems and the endeavor to extend them to all kinds of welding have resulted in striking developments. This work is divided into five parts as follows: Metals, electric welding, hot flame welding, the thermit process and miscellaneous

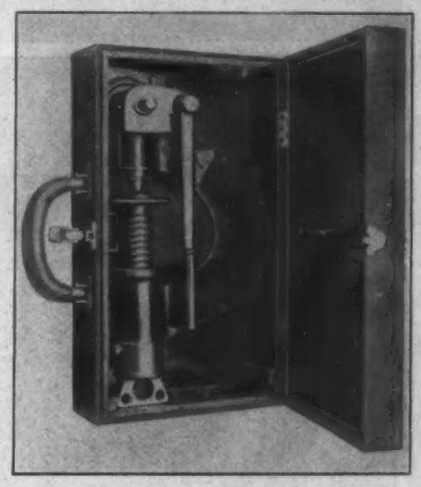


FIG. 2—MACHINE PACKED IN CASE

welding and soldering processes. The entire subject is treated from a practical standpoint and in addition to the subject matter, the work contains definitions of terms applied in this practice.

An interesting booklet entitled "Pyrometer Facts" has been issued by the Stupakoff Laboratories, Pittsburgh, and contains many valuable suggestions for users and prospective buyers of these temperature measuring instruments. A pyrometer is clearly defined in elementary language and a wall type galvanometer also is described. This same method is followed with reference to shelf type and portable test galvanometer, recording pyrometer, portable pyrometer, platinum, platinum-rhodium thermo-couple and water jacket. The descriptive matter is unusually clear and the booklet should prove of value to all engaged in high temperature work.

Electrically-Driven Bloom Shear

A Demag machine which gives satisfactory service with low power consumption

A new electric bloom shear has been designed by the Deutsche Maschinenfabrik A. G., of Duisburg, Germany, represented by Neumeyer & Dimond, 82 Beaver street, New York City, which embodies some interesting features. The advantages of electrical drive for steel works machinery are generally recognized, but it is not so well known that electric shears, if properly designed, will give satisfactory service with a low power consumption. The saving in power is especially marked when smaller billets are being cut than those for which the shears have been designed.

Figs. 2 and 3 illustrate the working principle of the Demag shear. The bloom to be cut is indicated by *B*. The upper ram, *O*, and the lower ram, *U*, move in the guides of the housing, *S*, and the lower ram is firmly connected with the crosshead, *T*, by means of the rods, *G*. The crankshaft, *E*, is fitted to the upper ram and moves with it. The crank is driven from the motor, *M*, through two pairs of heavy spur gears. From the eccentric pivot of the crank, a connecting rod leads to the pivot, *Z*, fitted in the crosshead, *T*. The downward movement of the lower ram, *U*, is limited by lugs cast in the base so that the bolt, *Z*, acts as a fixed point as long as the lower ram rests on the lugs through its own weight. When the shaft, *E*, is rotated by the motor, the connecting rod revolves first around the bolt, *Z*, so that the ram, *O*, in consequence of its own weight, moves downward together with the crankshaft until it is prevented from going further by resting on the bloom.

Fig. 3 shows this position of the rams. It also shows that as the upper ram is prevented from descending further, the crosshead, *T*, will be forced upward by the connecting rod and the lower ram will be drawn upward by the tension rods, and, as a result, the bloom is cut. From the moment the upper blade descends onto the bloom, the shears work like any other shears cutting from below with a stationary upper blade, the principal difference being that the upper blade holds the bloom down during cutting. Also, during the return of the lower blade to its lowest position after the cut has been effected, the method of operation does not differ from that of ordinary shears which cut from below. The moment the lower ram comes into contact with the lugs limiting its movement, the upper ram is suspended from the pivot, *Z*, by the connecting rod. Therefore, when the crank returns to its starting position, it forces the ram, *O*, into the position which it occupied at the beginning of the working cycle. In this position an automatic disengaging device stops the crankshaft, and the shear is ready to make another cut.

The two rams are partially counterbalanced by counterweights which are suspended below the floor on levers in order to save space above ground as much as possible. There are two sets of levers, the upper ram being connected to the weights by means of reach rods. The counterweights themselves are fitted to the levers with springs and run on guide rails.

The crankshaft carries a claw coupling, part of which is bolted to the driving wheel. The movable part of the coupling is subject to the pressure of a strong spring on one side, which tends to keep it in engagement, while on the other side it is actuated by a lever controlled by a cam. The cam is arranged to rotate around a pivot and can be swung out of the reach of the lever by releasing a ratchet arrangement. The ratchet device is governed by the hand lever shown in Fig. 1. A short pull on the hand lever brings the ratchet away from under the cam, which swings out and the spring engages the coupling. When the hand lever returns to its starting position, the ratchet device is

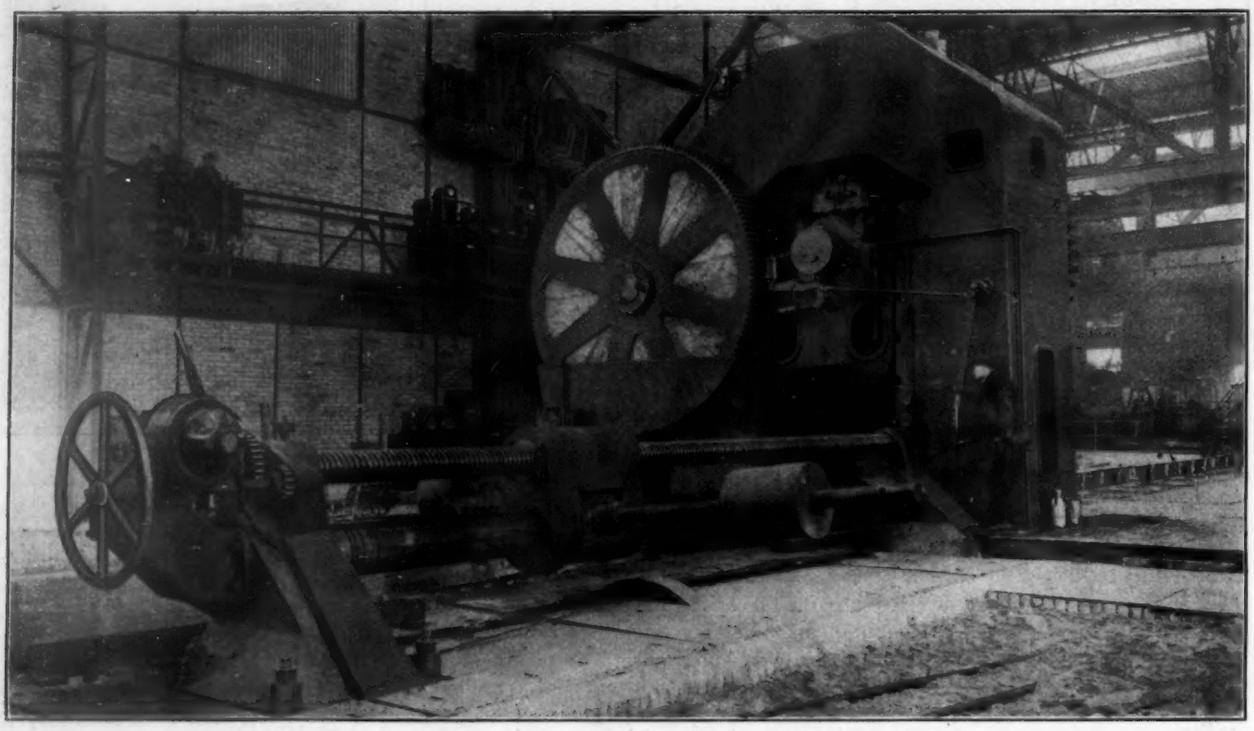


FIG. 1—REAR VIEW OF ELECTRICALLY-DRIVEN BLOOM SHEAR EQUIPPED WITH ADJUSTABLE STOP

again in contact with the cam, and after a complete revolution the coupling is disengaged. It will be noted that no disengagement takes place if the hand lever is held in its working position. The shear then cuts continuously.

All the force required to make the cut passes through the two rods and the connecting link between the two rams, leaving the frame practically free from stresses which reduces the possibility of breakage. Accidents of this nature occasionally happen with some electric shears, as they require large flywheels and consequently develop enormous forces if an obstruction gets between the knives. Such an obstruction is a billet which has cooled off to a point at which the shearing strength of the material becomes too great to be overcome by the knives. In the Demag shear, the steel rods are sufficiently strong to withstand this stress, as they are subjected to tension only. As a further safeguard against damage to the shear, a safety coupling is provided between the motor and the gears which has a pin that is sheared off in case the resistance between the knives exceeds a certain limit.

Method of Cutting

Another advantage claimed for this shear is that the cut is performed by the lower knife from below which makes a tilting table behind the shear unnecessary. Neither is a holding-down device of any kind required as the billet is firmly held between the upper ram and the anvil by a pressure equal to the unbalanced weight of the ram plus the tooth pressure on the driving wheel. The latter is always proportional to the shearing power. The billet is not lifted off the anvil or the roller table, and a clean, straight cut is insured.

Fig. 4 shows the front view of the first machine of this type built. It is capable of cutting billets up to 18 inches square, is driven by a 300-horsepower motor and can make four cuts per minute. Fig. 1 is a rear view of the same shear, showing the adjustable stop and the position of the operator who controls the entire mechanism by only one hand lever. Thirteen shears of this type have been delivered to leading steel works within the last three years.

FIG. 4—FRONT VIEW OF SHEAR SHOWING DRIVING MECHANISM

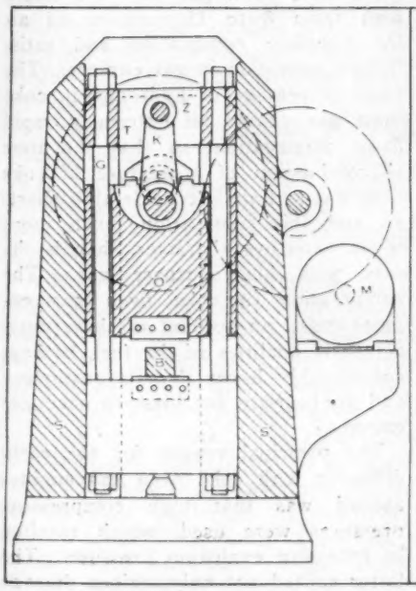


FIG. 2—DIAGRAM SHOWING SHEAR IN POSITION TO RECEIVE BLOOM

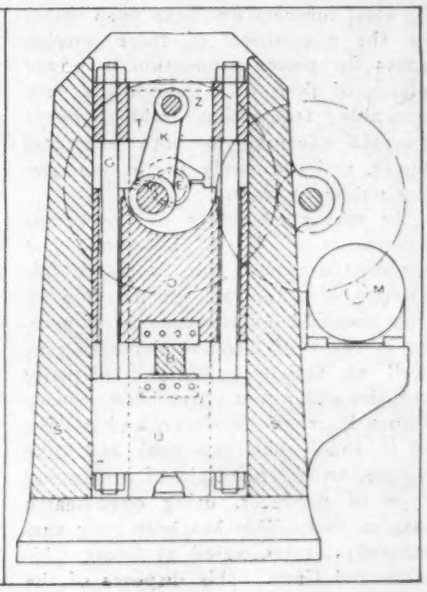


FIG. 3—DIAGRAM SHOWING SHEAR IN CUTTING POSITION

Vanadium Shear Knife

An interesting service test on a vanadium steel knife installed as the bottom blade in shears at the armor plate department of the Homestead works of the Carnegie Steel Co., recently has been made. The steel analyzed as follows: Carbon, 0.72 per cent; manganese, 1.48 per cent; vanadium, 0.19 per cent; silicon, 0.124 per cent; phosphorus, 0.027 per cent, and sulphur, 0.03 per cent. It will be noted that this vanadium steel was high in carbon and manganese. The knife was 7½ x 2⅝ inches and 131 inches long. It was installed in the shears on Nov. 14, 1913, and remained in continuous service until Dec. 16, only one of the four edges of the blade having been used. During this period it cut 800 tons of scrap. Owing to the numerous cuts made in shearing this material it is estimated that a blade in this service does three times as much work for a given number of tons cut than one employed for ordinary shearing. The average life of a blade where all four edges are used is 15 days when doing ordinary shearing, during which time about 150 tons of material are cut. This is an average of about 37½ tons per cutting edge, as compared with 800 tons, the record established by the high manganese vanadium steel blade.

Coke Oven Gas for Gas Engines

A comparison of blast furnace and coke oven gas engines with suggestions regarding gas mixtures

By Heinrich J Freyn

The American iron and steel manufacturer finds himself today barely at the threshold of enormous possibilities for practicing rational economy in the use of fuel. His fuel cost is by no means the smallest item which enters into the cost of manufacture, but the great wealth of this country in high grade fuels, together with a protective tariff, has heretofore made fuel economy relatively unimportant. In Germany, the use of raw coal for the purpose of iron and steel manufacture has been all but abandoned and large sums of money, formerly irrevocably wasted, are now being saved.

When scanning the literature of this country devoted to the application of gas power, little information will be found on the use of coke-oven gas for the generation of power in gas engines. This lack can be traced to the fact that the regenerative by-product coke oven with its large amount of surplus gas is still far from having attained in this country the universal application which it has found in Europe. This statement needs hardly any corroboration other than the evidence of statistical investigations made by E. W. Parker, of the United States Geological Survey, according to which only approximately 25 per cent of the total coke produced in this country in 1912 was made in by-product coke ovens, whereas 75 per cent was produced in beehive ovens. This entailed the enormous loss of over $80,000,000 in non-recovered by-products, such as gas, tar, and ammonia, without considering the substantial loss due to the non-recovery of benzol from the coal.

There are two more or less distinct fields of application of the by-product coke oven: One, to furnish as the main product metallurgical coke of specified quality, and surplus coke-oven gas as the by-product, and the other, to carbonize high volatile coals, and thus produce as the main product, large quantities of gas, high in heat value and rich in illuminants, adapted primarily for domestic heating and lighting, while domestic coke becomes the by-product.

Owing to the large tonnage of coke required in metallurgical industries, vast quantities of surplus gas become available, for which a field of usefulness must be found. Wherever a steel works is connected with the blast furnace plant, this surplus gas can advantageously be used in addition to that derived from the surplus blast furnace gas, in the manufacture and heating of steel, or for the production of power. Thus the necessity of shipping into the plant any other coal except coking coals can be practically eliminated.

With isolated blast furnace plants which produce their own by-product coke, the uses of the surplus gas are not so obvious, since the quantity of surplus blast furnace gas by far exceeds the immediate demand for power. But where blast furnaces are grouped in the vicinity of large cities, they will have a better opportunity than ever for profitably selling their surplus gases for domestic heating and lighting, or in the form of electric power, because they can furnish these commodities at lower cost than the cities themselves could produce them.

A Widening Field

Modern industrial life causes the demand for electric light and power to increase by leaps and bounds, so that public service corporations are constantly obliged to add to the capacity of their electric light and power plants. The purchase by such corporations of electric current generated from industrial surplus gases at nearby blast furnaces and coke oven plants or the acquisition of these surplus gases for power production in power plants of their own, becomes a very desirable transaction, which offers financial advantage to both seller and buyer, and ultimately to the consuming public at large.

By taking advantage of the recent innovation of H. A. Brassert, blast furnaces are now able to insure fulfillment of a contract for the delivery of a specified uniform amount of power in times of business depression as well as activity. Brassert virtually transformed a non-active blast furnace into a huge gas producer, and gasifies in it, small coke, raw coal, and coke breeze, on the principle of a slagging type of producer, using open-hearth slag as flux. This has been very successfully demonstrated at South Chicago and Gary. This disposes of the argument that curtailment of pig iron and coke production in time of business depression militates against the fulfillment of a contract of this nature.

In this country, at present, there are but very few coke oven gas engines of medium size in operation and these were built a number of years ago, when even the blast furnace gas engine was in its infancy. The blast furnace gas engine has today attained a very high standard, as can readily be seen by the truly remarkable results achieved with the world's largest gas engine plant at Gary; but the coke oven gas engine, although mechanically equivalent to the blast furnace gas engine, has to deal with a fuel of entirely different character.

Blast furnace gas contains on an average not more than 3½ per cent hydrogen, from 25 per cent to 28 per cent carbon monoxide, and has but a fraction of 1 per cent of methane; its heating value is about 95 to 100 B. T. U. per cubic foot. Coke oven gas, on the other hand, varies greatly in composition according to the kind of coal carbonized and the time of generation during the process of carbonization. It contains from 50 to 60 per cent hydrogen, 4 to 8 per cent carbon monoxide, 2 to 5 per cent illuminants and from 28 to 35 per cent methane and its heating value ranges from 450 to 650 B. T. U. per cubic foot. Blast furnace gas requires approximately its own volume of air, while coke oven gas must be mixed with from 8 to 15 volumes of air for complete combustion and satisfactory operation in gas engines. The large percentage of hydrogen in coke oven gas causes an extremely rapid flame propagation, so that the time of combustion of a mixture of coke oven gas and air is considerably shorter, and this combustion much more of an explosive character, than is the case with blast furnace gas. The compression in coke oven gas engines must, on account of these characteristic qualities of the fuel, be kept considerably lower than is customary and appropriate for blast furnace gas engines.

The principal reason for the early difficulty with coke oven gas engines abroad was that high compression pressures were used, which resulted in excessive explosion pressure. The latter caused not only serious damage to gas cylinders, pistons, and piston rods, but were responsible for ex-

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tremely unsatisfactory engine operation on account of severe premature explosions, which occurred particularly at heavy loads. Costly experience has taught European gas engine manufacturers to reduce the compression pressure in coke oven gas engines to 110, and even to 85 pounds per square inch, depending somewhat on the percentage of hydrogen in the gas. While, according to thermodynamic laws, a lower compression pressure is necessarily followed by a lower thermal efficiency, it has been found in practice in Germany that the actual heat consumption per brake-horsepower hour of coke oven gas engines at full load is practically the same as that of blast furnace gas engines for the same load condition. Theory and practice thus seemingly disagree, but the explanation of this phenomenon is not difficult: One reason is the better mechanical efficiency at lower compression, but the principal reason is that coke oven gas engines must, for practical considerations, be operated on very lean gas mixtures. The presence of a much larger quantity of air than is theoretically necessary, and the rapidity of flame propagation, result in perfect combustion of the charge at practically constant volume, while blast furnace gas engine indicator cards frequently reveal afterburning of the mixture during expansion.

Back-Firing Prevented

Owing to the snappy action of the gas, coke oven gas engines are at times quite susceptible to back-firing and premature explosions. Effective cooling of gas cylinders, pistons, piston rods, etc., becomes, therefore, a very important matter on account of the intense heating of these parts. The absolute quantities of coke oven gas consumed during one working cycle are comparatively small, even at full load, and perfect regulation of coke oven gas engines is, therefore, not as easily accomplished as that of blast furnace gas engines. Serious difficulties were encountered in the earlier days because it was found quite impossible to maintain satisfactory parallel operation, especially at fractional loads, of coke oven gas engine electric generators. Ignorance on the designer's part was very largely responsible for these difficulties, because gas ports and gas valve areas were made far too large, and entirely out of proportion to the size of the air ports, since no attention was paid to the low specific gravity of coke oven gas. Much larger quantities of gas than actually required at any specific load were thus caused to enter the gas cylinders, and these earlier engines nearly always operated on excessively rich mixtures. The obvious result was after-burning, destruction of exhaust valves, piston rods and cylinders, violent back-fires and vicious premature explosions, all of which caused extremely unsatisfactory commercial operation.

These difficulties can be readily overcome at present by correct application of a few simple laws and experiences on the designer's part. Today the coke oven gas engine has reached such a high state of perfection in Germany that it is second only to the blast furnace gas engine in importance and serviceableness, with the qualification, however, that unit capacity and more particularly the rating must be conservative.

Large Coke Oven Gas Engines

The latest coke oven gas engines built by Thyssen & Co., of Muelheim-Ruhr, Germany, were installed at Bonifacius Colliery in Westphalia. Each engine is of the twin tandem double-acting four-cycle type, having four gas cylinders, 47½ inches in diameter, 51 inches stroke, and develops at 94 revolutions per minute about 5,000 brake-horsepower. Alternating current of 5,000 volts is generated and used at the various pits for operating electric hoists and other machinery. The power station can be operated in parallel. It is tied in with the blast furnace gas engine station at Gelsenkirchen and with several steam turbine plants in the vicinity. Parallel operation is beyond criticism and the load factor of these engines is very high—from 90 to 100 per cent—since peak loads are taken up by the blast furnace gas engine plant and the steam turbines. These engines were built two years ago and are probably the largest coke oven gas engines in the world. Previous experiences with smaller gas engines were carefully considered when these engines were designed. The compression pressure is only 85 pounds and the maximum explosion pressure does not exceed 250 pounds per square inch. Each cylinder end is provided with three igniters. The gas consumption as measured by means of a large gas holder was found to be 12,000 B. T. U. per kilowatt-hour at 90-100 per cent load. The over all mechanical efficiency, including generator, is 82.3 per cent at that load. The engines are equipped with butterfly valve gear, and regulation is performed on the combination, quality-quantity principle.

In the opinion of Thyssen & Co., even larger coke oven gas engines than these could be built without difficulty. The repair costs of such engines would not be any higher than those for blast furnace gas engines, provided they receive equally efficient care. The Friedrich-Wilhelms-Huette of Muelheim-Ruhr, Germany, have installed what they contend is the largest coke oven gas engine plant in the world. The power house at Colliery Prinz Regent has a total capacity of 21,600 brake-horsepower and contains four double acting twin tandem gas engines of 4,000 brake-horsepower each, one double acting single tandem unit of 2,000 brake-horsepower, and two double acting single tandem units of 1,800 brake-horsepower. This firm is now building an air compressor direct coupled with a two-cylinder twin coke oven gas engine of 1,700 indicated horsepower, furnishing 8,750 cubic feet of free air per minute compressed to 85 pounds per square inch, which is used for various purposes about the coal mines. There are not many coke oven gas engines of such large unit capacity in operation in Europe, and it seems that about 1,100 to 1,200 brake-horsepower per double acting gas cylinder is at present the upper limit of such engines abroad.

The overwhelming majority of gas engine manufacturers in this country restrict the capacity of coke oven gas engines to about 700 or 850 brake-horsepower per double acting cylinder at present. This prudent and conservative policy on the part of American gas engine builders shows excellent judgment, and deserves warm appreciation and cordial support, because it will surely forestall troubles and disappointments. The coke producing industries should encourage this spirit and assist the manufacturers by installing coke oven gas engines and developing a field which has lain idle altogether too long. Ultimately the producer of electric power, using coke oven gas engines, will be the beneficiary if he is the benefactor now.

Effect of Sulphur

Turning now from the mechanical features of the coke oven gas engine to the fuel itself, it should be remembered that the presence of sulphur in coke oven gas in the form of sulphuretted hydrogen and carbon bisulphide was the cause of very serious troubles before it was learned how to combat its influence. The slightest water leak in the gas cylinders from defective pistons or water-cooled exhaust valves resulted in serious corrosion of all finished parts, and particularly of piston rings, piston rods, and metallic packing. Instead of striking at the root of the evil by proper sulphur purification, and by prevention of water leaks, at-

(*Continued on page 486b*)

Tests for Fire Brick and Clay

Processes that can be carried out at any iron or steel plant to ascertain quality of refractories

By J F Mowat

In the steel trade and allied industries, the use of fire brick and fire clay is so general that this material must be considered an important factor in the cost of operation. Consequently, the quality of these products has a real bearing on profits. Blast furnaces must be lined and relined, heating furnaces, open-hearth furnaces and coke ovens must be built, repaired and rebuilt. Repair work is not only expensive, but at times causes delays which involve a serious loss of money.

It is a surprising fact that up to a few years ago little attention was given to the choice of refractory materials. Personal prejudice or low cost, as a rule, determined what brand or make should be used. As a result, most companies had no real idea as to the merits of the materials they were using and so carried out expensive involuntary experiments in their blast furnace linings and in their furnaces.

Preliminary Tests

In recent years the manufacturers have begun to awaken to the fact that it is cheaper to know what they are going to use, rather than to trust to luck that the brick or clay will be satisfactory and not in the long run prove highly expensive. This has led to a common-sense view of the situation that is causing a demand for preliminary tests to prove the worth of these materials before they are accepted.

These tests may be made in a comparatively short time, and when conducted on representative samples give a reliable indication of the behavior of the materials in service. They may be rather elaborate, consisting of physical tests, chemical analyses and heat tests. I will consider first the testing of brick and then that of clay.

Physical Tests of Brick

The physical tests include the determination of the crushing strength, the specific gravity and the resistance to abrasion. These tests are of minor importance compared with the heat tests, though they are desirable when complete data are desired. It is not essential to find the crushing strength, for almost always it will show a considerable factor of safety. I do not remember a case, of the large number of tests that I have made, when the crushing strength was not far greater than necessary to carry the maximum load to be applied.

The determination of specific gravity is of interest principally from the fact that it shows the density of the brick. This has an influence on its power of resisting abrasion. Bricks of greater density have this power in a higher degree, generally, than those of the same composition, but of lesser density. Specific gravity is found by weighing the brick dry, then immersing it in a vessel filled with hot water and allowing it to remain until the air has been expelled and the absorption of water has ceased. Though a shorter time is sufficient, it is advisable to leave it in the water from 18 to 24 hours. At the end of this time the brick should be weighed while suspended in water and then removed, wiped dry and weighed again. Calling the weight dry A, the wet B and the weight in water C, we have the following formula:

$$\text{True specific gravity} = \frac{A}{A-C}$$

$$\text{Apparent specific gravity} = \frac{A}{B-C}$$

$$\text{Porosity, per cent of voids} = \frac{B-A}{B-C}$$

$$\text{Absorption, per cent by weight} = \frac{C-A}{A}$$

The True Specific Gravity

The true specific gravity is the ratio of the weight of the brick to the weight of a volume of water equal to the volume that the brick would have, if it were compressed into a non-porous mass. The apparent specific gravity, which is the figure on which density is based, is the ratio of the weight of the brick to a volume of water equal to the apparent volume of the brick, that is, the volume displaced were the brick without voids. The porosity is the per cent of voids in this total volume, while the absorption is the ratio of water, by weight, taken up, to the weight of the dry brick. The weights should be measured on a balance and should be, if possible, for the whole brick. However, if a large balance is not available, the determinations may be made on a fragment of brick with sufficiently accurate results.

Measuring Abrasion

Abrasion, in the case of fire brick, occurs principally in the linings of blast furnaces and of coke ovens. There are several arbitrary methods of measuring it, but the one I found most convenient was to weigh the brick and then hold it, with a uniform pressure, to the side of an emery wheel revolving at constant speed. Having determined the specific gravity, it was possible to find the cubic inches of brick removed per square inch of surface exposed from the loss in weight. The results obtained, of course, are only comparative, but as such are of value in choosing a brick capable of resisting wear. The apparatus is simple, consisting of a carriage to hold the brick, running on practically frictionless rollers and held against the emery wheel by a bell crank with a weight attached. As the movement is small, the pressure exerted on the carriage is practically constant. Fig. 1 shows this arrangement.

Heat Tests

Far more important than the abrasion tests, except in the case of brick exposed to continual wear, are the heat tests. In these it is desirable, first, to ascertain whether the bricks will soften or melt when exposed to the temperature at which they are to be used; second, to learn how much they will expand or contract when hot and third, to determine whether there is a change in size which continues

J. F. Mowat

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after they are cooled to their original temperature.

The analysis is valuable in furnishing an indication of the probable resistance to heat. It should be made on a sample taken from the heart of the brick, to avoid surface impurities and should show silica, SiO_2; alumina, Al_2O_3; ferric oxide, Fe_2O_3; lime, Cao; magnesia, M_gO, and the alkalis, sodium and potassium oxides, Na_2O and K_2O. Of these constituents, the iron oxide, lime and alkalis have an effect on the refractory qualities. Lime and the alkalis generally occur in small enough quantities to have, in themselves, no bad effect. Iron oxide, on the other hand, occurs as a rule in larger quantities and as it is an excellent flux for silica in the presence of the other fluxes, should be looked on with suspicion. As a rule, more than 4 per cent of ferric oxide causes danger of softening. When it reaches 5 per cent, with from 2 to 3 per cent of alkalis and 0.5 per cent of lime, the brick is almost certain to become plastic at less than 3,000 degrees Fahr.

The expansion when hot, is of more importance with silica than with clay brick, as the former always expand approximately ¼ inch to the foot when heated to 2,900-3,000 degrees Fahr., while the latter generally expand from 0.05 to 0.1 inch to the foot at the same temperature. It is evident that with a brick that increases perceptibly in size, it is advisable to provide expansion joints. A measure of the expansion determines the size of these joints.

The permanent change in size is an indication of the temperature at which the bricks were burned in the kilns. Clay brick shrinks when burned, while silica brick expands. Consequently, if you heat a clay brick and find that when cool it is smaller, or with a silica brick, that it is larger, you may be confident that the temperature in the furnace was higher than that in the kiln where it was burned.

Table I.

Analyses of Good Brick and Clay. Per Cent by Weight.

	SiO_2	Al_2O_3	Fe_2O_3	CaO	Mgo	Na_2O and K_2O	Loss on Ignition
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Silica Brick	94.00	2.50	1.00	2.00	0.20	0.20	0.10
Clay Brick	54.50	40.00	3.00	0.30	0.50	1.60	0.10
Plastic Brick	55.00	30.00	2.00	0.20	0.70	2.10	10.00

Heat Tests of Brick

In order to conduct the tests, it is necessary to have a suitable furnace for heating the samples. Experience with several types leads me to prefer the one shown in Fig. 2. This is a horizontal, cylindrical furnace, closed on the ends by counterweighted brick doors, and provided with supports to hold the sample bricks up so that the flame can pass around them. The fuel may be either crude oil or illuminating, coke oven or natural gas. Gas makes the better fuel, owing to the ease in handling it, its rapid combustion and freedom from trouble during cold weather. The fuel should be forced in with compressed air, to get rapid combustion and an intense local heat. I have obtained the best results with the burner shown in Fig. 4. The flame from the six burners, which are about 13 inches apart, enters tangentially at the top of the furnace and, traveling with considerable force, is whirled around the cylinder two or three times before it finds the flues which are located on the same side as the burners and are likewise tangent to the cylinder. The escaping gases preheat the air supply for the burners. The arrangement of the furnace and burners insures a thorough mixture of the gas and air, allows ample time for combustion to take place and distributes the heat uniformly, so that an even temperature may be maintained. Using coke oven gas for fuel, I have produced a maximum temperature of 3,200 degrees Fahr. in this furnace and, as a rule, have had little trouble in reaching between 2,900 and 3,000 degrees Fahr.

Following are directions for conducting a test with the furnace. Select the sample, choosing bricks that are representative of the whole lot. A good way is to shut your eyes and pick here and there from the pile. This does away with the personal factor.

Nine-inch brick are most convenient to use, but other sizes may readily be tested. Take enough to make a total length of about three feet when laid end to end. To determine the permanent change in size, measure the length of each brick on both sides and in the middle and make a record of its position and number for identification of the dimensions.

The next thing to do is to prepare to measure the expansion of the brick when hot. To do this we have used water-cooled calipers, as shown in Fig. 3. When water is running through the pipes, they may be inserted in the hot furnace without error due to expansion. With a sample consisting of four 9-inch bricks, laid end to end, the initial length is great enough to reduce the error in observations to a fairly small figure.

Lay the brick out on the shelf in front of the furnace to measure the individual lengths and the total length when laid end to end. Next caliper the samples by placing the jaws across the ends, marking the pipe at the outside end of the sleeve, *A*, Fig. 3, with a lead pencil. Next place the bricks on the supports in the furnace, in the same relative positions, to insure getting the inequalities located so as to give the same total length. Check this length with calipers to make sure that the pencil mark comes at the right place. The furnace will hold two of these samples.

Table II.

Sieve Test of Properly Ground Clay

Per cent by weight on	Per cent
10 mesh sieve	0.00
20 mesh sieve	14.00
40 mesh sieve	26.00
60 mesh sieve	23.00
80 mesh sieve	1.00
100 mesh sieve	5.00
200 mesh sieve	16.00
Through 200 mesh sieve	15.00

Heating the Bricks

The bricks are now ready to heat; light the gas and allow it to burn for a time with an insufficient supply of air. This allows the bricks to heat slowly, an advisable proceeding in all cases, but essential with silica brick, as rapid heating produces a much higher temperature on the surface than in the interior and due to their high rate of expansion, causes them to spall and crack. After about an hour, the temperature may be increased gradually, reaching a maximum in from four to six hours. It is advisable to maintain this temperature for at least two hours, in order to allow the brick to become heated through. The temperature to be attained is to be determined by the probable temperature to which the bricks are to be exposed. Thus, for silica brick to be used in coke ovens and open-hearth furnaces, it is well to reach a temperature of 3,000 degrees Fahr. This also applies to the hearth and bosh and inwall brick for blast furnaces. These are the brick that extend from the bottom, or hearth, about two-thirds of the way to the top. In the case of brick for heating furnaces, it is generally sufficient

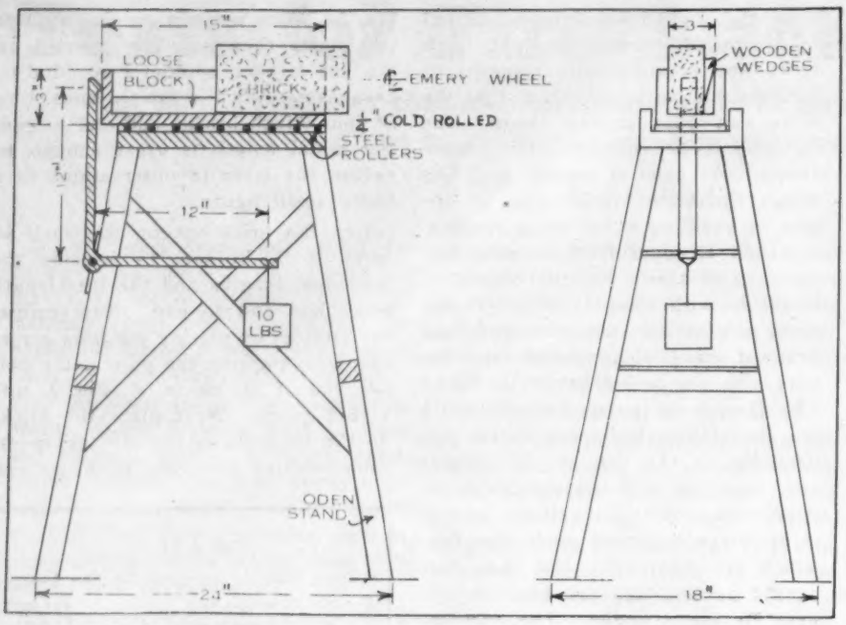


FIG. 1—APPARATUS FOR ABRASION TEST WITH EMERY WHEEL

to reach a temperature of 2,700 degrees Fahr., though checker brick sometimes get hotter than this. The samples should be watched carefully through the inspection holes, so that if any softening becomes apparent, the temperature may be noted.

We have tried various methods of measuring the temperature, using Seger cones, thermo-couples and optical pyrometers. Seger cones are not adapted to this work and proved unreliable, and were used merely as a rough check on the pyrometer. The trouble with the thermo-couples was that we could find none that would last a reasonable time at the high temperatures reached. The instrument that we finally pinned our faith to was the Warneck optical pyrometer. We are able to calibrate this before each test and have always obtained results that compare in accuracy with any other form of pyrometer that we have used.

After the bricks have remained in the furnace the proper time, connect the supply hose to the calipers, turn on the water and turn off the gas. Immediately insert the calipers, hold the jaws firmly against the brick and have an assistant mark the pipe at the end of the sleeve. The distance between the two marks shows the actual amount that the bricks have expanded. From this figure and the original length, the expansion per lineal foot at the maximum temperature may be calculated. The result shows whether expansion joints will be required and if so, how large they should be.

After the bricks are cold, remove them from the furnace in order and examine them to see whether there is excessive pitting due to iron oxide and whether they show any signs of softening or fusion. Softening in the test furnace in the short time they are heated means a greater degree of softening in the furnaces where the heat endures for a long time. Consequently, if this is appreciable, the brick should be rejected. Another point of interest is cracking and spalling. If the samples are heated carefully they should neither crack nor spall, so if they space badly, or develop large cracks, they should not be used, as this same condition will undoubtedly occur where they are used.

Next measure the brick at the sides and middle to see whether there is a permanent elongation or contraction. For comparison with other brick this should be calculated per lineal foot. If there is a contraction in the case of the clay brick, or an expansion in the case of the silica brick, the samples have not been burned long enough. It is better to do the burning in the kilns rather than in the furnaces where they are to be used, so this point should be insisted upon.

Testing Fire Clays

There are several qualities to watch in the case of clays. As with brick, the analysis gives a good indication of the refractory power. Here, too, the iron oxide, lime and alkalis should be examined, for in the same way they may produce fluxing. This is not as serious as in the case of brick, for a small amount of fusion is a good quality, since the clay possessing it will make a stronger bond than will an inert clay. Excessive fusion, on the other hand, will cause the clay to melt and run out from between the bricks.

The heat tests are to be made in the same furnace as the brick tests and at the same temperatures. The best way to proceed is to mix the clay with water to the plasticity of putty and then mold it into the form of Seger cones. These are pyramids, about 3 inches high, with bases about ⅝ inch on each side. They should be dried and then set upright on clay bases. A row of four cones in a base constitutes a sample. The samples next should be thoroughly dried in a steam oven to drive off all the moisture and then should be heated in the test furnace. The points to watch are excessive fusion or melting and serious pitting due to iron oxide. A little experience will enable one to segregate the good clays from the bad.

There are two other points as important as the ability to resist heat. These are fineness and plasticity. All clay used for laying fire brick should be ground and screened. To make good joints the clay should be made into a *soup*, thin enough to allow very small joints to be made. The brick should be laid close together, preferably about 0.6 inch apart. Conse-

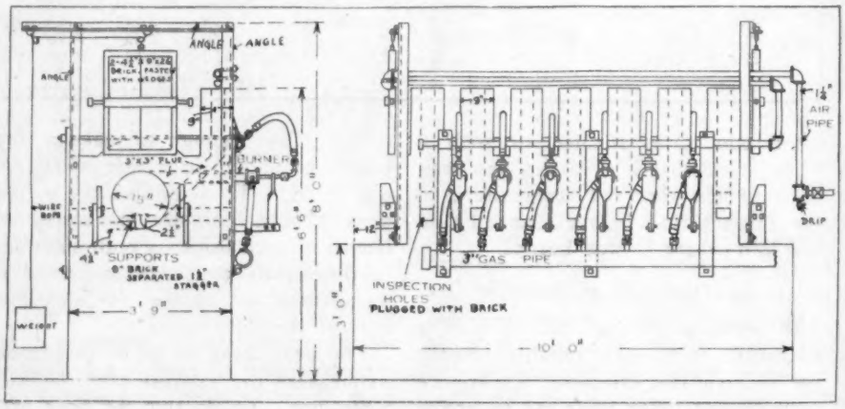


FIG. 2—BRICK TESTING FURNACE

quently, it is evident that the clay should be ground fine. All should pass through a 10-mesh sieve and the greater part through a 20-mesh sieve.

Plasticity is of importance in mixing the clay. A sandy clay, when mixed with water, will settle-out very rapidly, so that it will be next to impossible to use it successfully. On the other hand, a plastic clay will remain in suspension a considerable length of time, making a *soup* that will remain mixed until used. A simple test is to put ½ inch of clay in a drinking glass, add water and stir. If the clay settles-out rapidly, it will prove hard to use, while if it remains in suspension it will be satisfactory.

In conclusion, I will include, for convenience, the summary of the tests to be made.

Tests of Fire Brick

Crushing Strength.—This is almost invariably far higher than necessary, so the test may be omitted, unless results from an academic standpoint are desired.

Specific Gravity.—The apparent specific gravity determines the density, which is an indication of the wearing qualities of different brands of brick of approximately the same composition.

Abrasion.—The comparison of the powers of different bricks to resist abrasion is of value when choosing bricks for the top of blast furnace linings and for the linings of coke ovens. Otherwise this feature is not particularly important.

Analysis.—The analysis furnishes a good indication as to what the refractory qualities of the brick will be and explains the results obtained from the heat tests.

Refractory Qualities.—The tests should be made at a temperature ranging from 2,700 to 3,000 degrees Fahr., depending on the use for which the bricks are intended. Either softening or melting, cracking or spalling to a marked extent, or serious pitting due to iron oxide, is enough to warrant rejection.

Expansion When Hot.—This is an indication of the size the brick will attain in service and is of value in designing furnaces.

Permanent Change of Size.—Underburned brick are unreliable when heated above the kiln temperature and therefore are not desirable. A permanent change in size that continues after the bricks are cold is a proof of such a condition.

Tests of Fire Clays

Analysis.—As in the case of brick, this gives a reliable indication of the refractory qualities of the clay.

Heat Tests.—Excessive fusion, melting or serious pitting are enough to condemn a clay, where heat resistance is required. On the other hand, incipient fusion is beneficial, as it promotes a good bond.

Fineness.—It is of primary importance to have a clay fine enough to make very thin joints, as these are essential to successful furnace work.

Plasticity.—A clay that remains in suspension produces a good mortar. Plasticity is the quality that produces this result, so it should be observed.

As a rule, it is not necessary to make all these tests, unless complete data are desired. For general work, the tests of crushing strength, specific gravity and abrasion may be omitted. It is comparatively simple to make the rest of the tests, and the cost will be small compared with the increased efficiency of the brickwork.

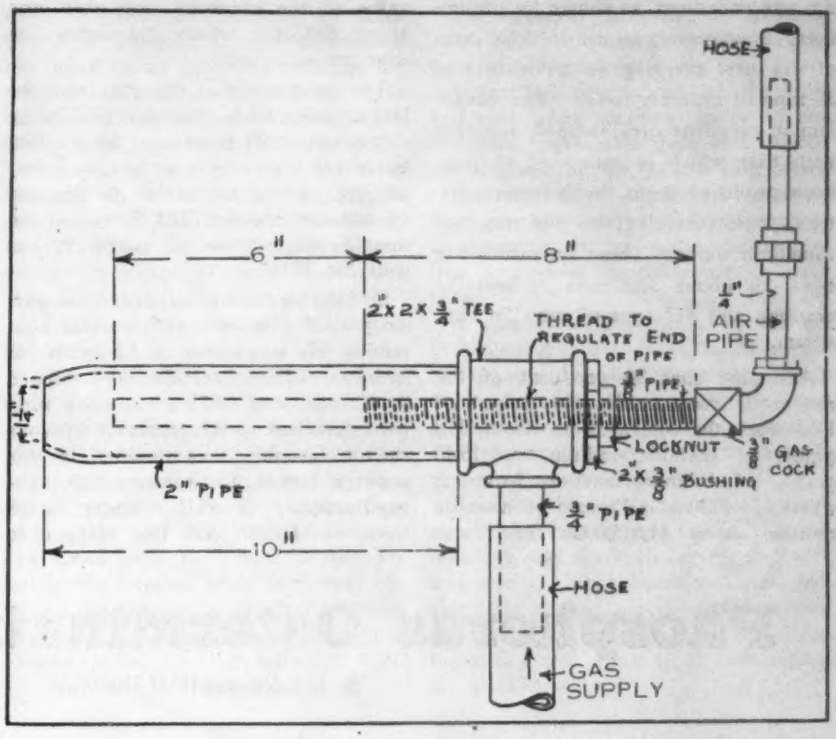


FIG. 4—GAS BURNER

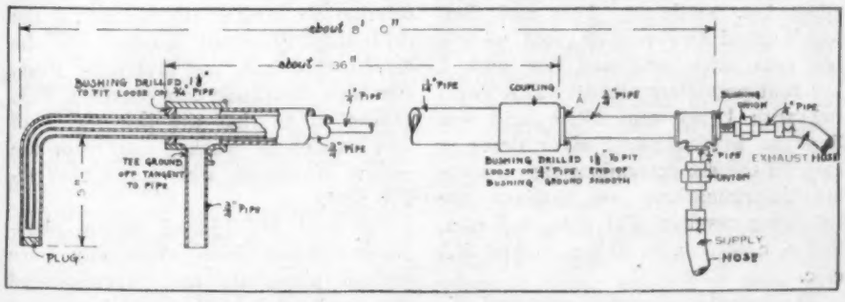


FIG. 3—WATER-COOLED CALIPERS

Rare Metal Ores

Probably no other mineral is mined which has so large a hold on public attention and at the same time has so small a total monetary value as the uranium minerals. This interest is, of course, due not to the minerals as such, nor to the uranium they contain, but to the accompanying radium, which is found only with uranium.

Uranium minerals were produced in commercial quantity in the United States in 1913, as shown by preliminary statistics gathered by Frank L. Hess, of the United States geological survey, only in Colorado and Utah, and although during the year some pitchblende was mined in Colorado in the Belcher & Calhoun mines, only a few pounds were sold, though 50 dry tons of low-grade material carrying 1.49 per cent uranium oxide (U_3O_8) was shipped to France. This had been mined in a previous year.

The total mine shipments of urani-

um and vanadium, as shown by preliminary figures were equal to 2,140 tons of dry ore, carrying an equivalent of 38 tons of uranium oxide. The vanadium in carnotite ores shipped, together with that which is estimated to have been produced from the Newmire district, was equivalent to 914 tons of vanadium oxide. These quantities are equal to about 32.3 tons of metallic uranium and 412 tons of metallic vanadium.

Assuming that 90 per cent of the radium is recoverable, the output of 1913 would be equivalent to about 8.79 grams of metallic radium, or 16.40 grams of hydrous radium bromide, worth, at $120 a milligram of metallic radium, about $1,055,000. The total value of the carnotite ores sold was about $142,000, which represents the uranium value only.

The production of the year was the largest ever made, that for 1912 being equivalent to 26 short tons of uranium oxide (22 tons of the metal), and that for 1911 being equivalent to 25 tons of uranium oxide (21.2 tons of the metal)—an increase of nearly 50 per cent for 1913.

Of the quantity produced, apparently 19.25 tons of uranium oxide containing the equivalent of 8.3 grams of hydrous radium bromide, was shipped to Europe, and 18.75 tons, containing the equivalent of 8.1 grams of hydrous radium bromide, was retained in this country, although in tonnage the quantity retained in this country, 1,198 tons, was larger than that shipped to Europe, which was apparently 942 tons.

A prominent feature of uranium and vanadium production during the year was the change in method of payment by American buyers, who no longer paid for the vanadium content in the ore but bought it on the basis of the uranium oxide content alone, though they received payment for the vanadium abroad. However, the miner received more or less compensation in a higher price for the uranium oxide he sold. Prices varied greatly and returns to the survey show that the price per pound for contained uranium oxide ranged from $1 for ores carrying 0.6 per cent uranium oxide to $4.60 for one lot carrying 3.15 per cent uranium oxide and 4.82 per cent vanadium oxide.

Phosphorus Determination in Iron

By L Selmi and W H Whitfield

It is a common practice among iron chemists to standardize alkalimetric solution for phosphorus determination by aid of standard material of known phosphorus content. The reason why this should be so, and no attention paid to the reactions involved in this alkalimetric method is probably not familiar to all chemists.

As is well known, the Handy's or alkalimetric method is based on the following reaction:

$$2\,[(NH_4)_3\,12\,MoO_3PO_4] + 46\,NaOH + H_2O = 2\,[(NH_4)_2HPO_4] + NH_4)_2 + MoO_4 + 23\,Na_2MoO_4 + 23\,H_2O.$$

But many an iron chemist has tried and failed to bring his work to check with the theoretical phosphorus as may be figured from the above reaction. The commonly accepted method of standardizing the alkali solution with standard material obviously is risky, as a mistake made in running the standard would prove a costly one. In addition, by so doing, the iron chemist severs his connection with the theory of chemistry and falls into pure and simple empirism.

We made a stock alkali solution in our laboratory and matched it with a nitric acid solution of exactly the same strength. We determined the normal factor of our soda solution by titrating it against an hydrochloric acid standard, 0.271 normal. The normal factor on the hydrochloric acid had been accurately determined previously. Our soda solution came out 0.195 normal and this normal factor was checked also by titrating with known amounts of oxalic acid for standardizing. One c. c. of soda solution of this strength, according to the reaction, as previously indicated, is equivalent to 0.0002628 grams phosphorus; that is, 19.2 c. c. of such a soda solution would be required to neutralize the yellow precipitate derived from 2.628 grams of the cast iron standard C. (bureau of standards) whose phosphorus is given as 0.192 per cent.

We weighed six different portions, 2.628 grams of standard C, and dissolved with 100 c. c. of 1.13 specific gravity nitric acid. After solution was complete, we filtered and washed. To the filtrate and washing we added 10 c. c. of permanganate (30 grams per liter) and boiled again for 10 minutes. The manganese precipitate was then reduced with ferrous ammonium sulphate, free from phosphorus, and boiled again for 10 minutes. We cooled and added 20 c. c. of ammonia and brought to 85 C. and precipitated with 50 c. c. of molybdate solution. Before adding the molybdate, in some instances we added a few drops of nitric acid to bring the iron solution to the amber color desired. The yellow precipitate was allowed to settle one hour and then was filtered and washed, first with 1 per cent nitric acid and last with 1 per cent potassium nitrate. The washing with 1 per cent nitric acid was done on a filter paper eight times in each of the six determinations. In the six determinations we obtained the following results: 21.1 c. c., 21.2 c. c., 21.2 c. c., 21.3 c. c., 21.2 c. c., and 21.2 c. c.

This would give for standard C., 0.212 phosphorus as against the true phosphorus, 0.192 per cent. We realize that the cause of this discrepancy was due to some impurity which entered into constant proportion in the yellow precipitate, as this was obtained under exactly the same condition and treated likewise in each determination. To prove that this impurity is iron, after titration we acidified the residue in the flask with HCl and boiled, then neutralized with ammonia and filtered and washed thoroughly with water. Then a weak solution of warm HCl was poured on the filter paper and received into a solution of potassium ferro-cyanide, when an intense Prussian blue color developed as an indication that appreciable quantities of iron were carried along with the yellow precipitate in each determination. From material varying in phosphorus content we precipitated yellow phospho molybdate amounting to from 0.1 to 0.5 gram and subjected the same to a thorough washing with 1 per cent nitric acid solution. In some instances the washing was prolonged up to 50 times, and after titration with a soda solution we treated the residue in the previously described manner for the detection of iron, and invariably Prussian blue coloration was obtained. This proved to us that the last traces of iron cannot be washed out from the yellow precipitate with 1 per cent nitric acid.

We next precipitated yellow phospho-molybdate from chemically pure sodium phosphate and reprecipitated the same and washed it thoroughly

with nitric acid. We dried it at 100 degrees Cent. to constant weight and portions of half a gram and one gram were titrated against our soda solution, obtaining the following results: For 0.5 gram, 31 c. c. of soda were used; for 1 gram, 62 c. c. of soda were used. This gives 0.0002629 as the phosphorus value per c. c. of our soda solution, which value checks almost exactly with the value derived from the reaction as stated. We next precipitated from the bureau of Standard C. about 4 grams of yellow precipitate and washed this thoroughly with 1 per cent nitric acid and dried it at 100 degrees Cent. to constant weight. Portions of this precipitate titrated against our soda gave the following results:

	C. C.
0.5 grams	34.50
0.5 grams	34.40
0.5 grams	34.50
1.0 grams	69.00

From these results the phosphorus value of our solution is 0.0002362. We then weighed six portions of 2.362 grams of standard C. and determined the phosphorus by using exactly the method outlined above, and on these six determinations we obtained 0.192, 0.195, 0.189, 0.190, 0.192 and 0.194. These results are a close check of standard C. It is needless to say, in every one of the last six determinations referred to we detected appreciable quantities of iron as carried over with the yellow precipitate.

At last we ran four determinations on standard C, taking 2.628 grams of the standard for each determination, and the yellow precipitate obtained from these, after washing with nitric acid solution, was dissolved with dilute ammonia and reprecipitated. This second precipitate, washed eight times with nitric acid solution and four or five times with potassium nitrate solution, we titrated with our soda, obtaining the following results: 19, 1910, 19.40 and 19.20 c. c. These check closely with the phosphorus, 0.192 per cent, as given for cast iron C.

The general practice of washing, seven or eight times, the yellow precipitate with 1 per cent nitric acid, is not sufficient to remove all of the iron, and even after washing up to 40 and 50 times, appreciable quantities of iron are retained by the yellow precipitate.

Systematically conducted analysis may give accurate results inasmuch as it appears that the same quantity of iron impurities is contained in each case.

A standardizing solution, by the aid of phosphorus standards, is to be relied upon only when the routine work material is of approximately the same phosphorus content as the standard, and the routine work is run exactly the same as the standard.

A solution can be standardized strictly by making use of the reaction involved, and made to correspond with any standard phosphorus material, provided the yellow precipitate is purified by reprecipitation, as otherwise iron impurities will cling to it and cannot be washed out.

Conserving Lake Superior Ores

By C K Leith.

The questions as to what grades of ore it pays to conserve for the future, and the valuation of low-grade reserves, are becoming immediate and definite as applied to individual ore deposits and seem to call for some sort of quantitative answer. Both opinion and practice involving these questions differ widely. The number of variables in this problem is so large that final solution will perhaps never be agreed upon, yet there seem to be certain controlling factors which can be placed in quantitative relation and serve to reduce the number of variables which it is necessary to consider in a given instance.

I assume that it will not pay either for the individual or for the state to conserve any ore when the present cost of conservation, by stock piling or otherwise, when compounded at 6 per cent for the number of years which would elapse before this ore is used, will exceed the profit which the ore will yield when it is used. It may be urged that any loss to the individual may be made up in gain to the state. This might be true if there was any definite limit to the amount of iron ore, but when we remember that iron makes up 4 per cent of all the rocks of the earth and the amount of rock-carrying iron in excess of 20 per cent is, for practical purposes, unlimited, it is apparent that posterity is assured of its iron ore. The changes will be mainly in methods and cost of extracting the ore. Therefore, any expenditure of money or effort now, which when compounded will exceed the worth of the effort or money needed in the future to utilize the iron, is a net loss both to the individual and to the community.

Future Profits

Just as ores now show the widest variety of availability, depending on chemical and mineralogical composition, texture, geologic and geographic position, cost of mining, etc., so the ores of lower grade which will be used in the future will show like variation in availability. The only factor common to all ores which can be used to summarize and compare the different ores is profit per ton. Profit now determines whether a given ore can be used and will determine this in the future. If, therefore, we can approximate the profit per ton for any given ore, at any given time in the future, we can easily calculate how much, if anything, one can afford to spend now to save this ore. This profit can never be accurately predicted in advance, but I believe it may have much the same relation to values of higher grade ores as it has at present. If a 50 per cent ore now shows a mining profit of $1.50 per ton, the lower grades as calculated from penalties will show profits of a fraction of this amount. In certain favored Lake Superior localities 38 to 40 per cent low phosphorus, high silica ore can be mined now at a profit of 25 cents or less. In less favored localities, where now only the higher grade ores are being mined, the time will come when the lower grade ores will necessarily be mined; but when this time arrives, the profit per ton will probably be at least as low as the present profit for such low grade ores mined from the most favored localities and as low as the price we now figure from penalties. The total cost to the consumer may be the same, but relatively more of the cost will go to fuel and to handling the larger quantities of material necessary to produce a given unit of finished product.

For any given iron ore district, the rate of exhaustion of the higher grade reserves may be roughly figured and the time estimated in which the successively lower grades are likely to come into use. For instance, the average percentage of iron in the Lake Superior ores has been showing during the past decade a drop of about a third of 1 per cent per year. With a present average of about 49 per cent natural, at the present rate of decrease of grade, a 45 per cent

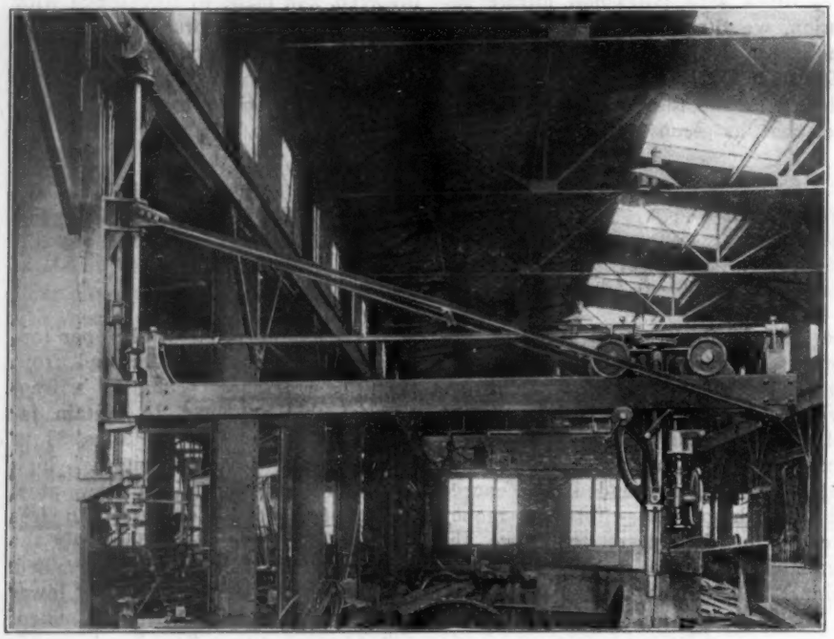
Presented at the February meeting of the American Institute of Mining Engineers.

ore would come to be used in about 12 years. This time, of course, would not be uniform for all districts. Certain ores will be used long before others. This is a minimum time, because we must remember that as the grade falls the tonnage of available ores is enormously larger, which will slow up the rate of the decrease of grade. Also it is to be remembered that really only a small portion of Lake Superior is thoroughly explored. I think that, outside of the Mesabi, for a hundred years to come, high grade reserves will be added more or less in proportion to the expenditure made in exploration. Finally, there is the probability of effective competition of foreign ores. I should say, roughly, that in any given district, one would need to be optimistic to predict the use of an average grade 5 per cent lower than the present prevailing grade in a period shorter than 30 years.

With these facts in mind, let us assume that it costs now 25 cents per ton to conserve an ore which is five points lower than the present commercial grade. Let us also say that this lower grade when mined is going to yield a profit of 50 cents a ton. It is apparent that such an ore must be used in 12 years unless there is to be a loss on the money invested in conserving the ore. If, on the other hand, it costs only 10 cents per ton to conserve this ore, and the profit is assumed to be 50 cents per ton in the future, it would be possible to hold the ore 28 years. If the profit per ton is assumed to be 25 cents and the present cost of conserving it is 5 cents, it is possible to hold it for 28 years.

Low Profits

Without going into further illustrations, and without arguing for any specific figures of time and profit, it seems clear that there is a narrow limit to the sums which it is wise to spend to conserve low grade ores. It is my opinion that 25 cents per ton profit at a period over 30 years away may be the condition under which the greater part of the ores five points lower than the present standard will be mined. It is apparent that it would pay to spend a very few cents a ton to conserve these ores. If this is true, the present value per ton in the ground of such low grade ores is practically negligible.



RADIAL DRILL AND REAMER OF THE WALL TYPE

Wall Type Radial

A radial drill and reamer of the wall type is being built by the Vulcan Engineering Sales Co., Chicago, to meet the requirements of bridge, structural, boiler, car and railroad shops, ship yards and other plants where large surface areas are to be covered for drilling, reaming or countersinking. As shown in the accompanying illustrations, the machine can be bolted to a building column or to the wall, or it can be carried on a truck or car, thereby making it portable. The latter is an exceedingly valuable adaptation in any shop where long lines of holes are to be drilled or reamed, such as bridge girders, hulls, boiler sections, etc. A stud is furnished in the boom end of the casting to provide a means for anchoring the boom to the floor when drilling holes of large diameter.

Power is obtained through coupling a countershaft, either belt or gear-driven, to the upper horizontal friction clutch shaft. The wall plate is a heavy casting provided with machined ways to guide the elevating carriage, which in turn supports the boom and sway bars. This carriage has large, bronze-bushed lugs through which passes the vertical shaft. Cupped brass frictions engaging with spur gears operate the screw shaft for raising and lowering the carriage. The spindle carriage is a heavy, ribbed casting supported on truck wheels. Provision is made for locking the carriage in position when drilling and reaming, and it is arranged to take the direct thrust of the spindle. The spindle carriage is assembled with ball bearings for end thrusts, in a large and substantial sleeve having a ground fit to the bore of the carriage frame. A large bevel gear guides and drives the upper end of the spindle. The power feed consists of four changes of gears in connection with the worm gear and friction clutch device. The hand feed is direct and is operated by the large hand wheel, which also constitutes the quick return when the power feed is disengaged. A counterweight automatically raises the spindle on the release of the hand feed. The horizontal carriage travel is 10 feet 9 inches and the vertical travel of the boom, 3 feet 6 inches. The swing of the boom is 180 degrees. Five horsepower are required to operate the machine.

On account of the increased cost of fuel oil for battleships and the fact that foreign corporations are rapidly purchasing reserves of oil in the United States, the secretary of the navy has recommended to congress the policy of producing crude oil from the naval reserves and obtaining fuel oil from it. There has been unusual progress in many parts of the country in petroleum refining, especially in the dehydration of heavy crude oils, in obtaining gasoline from natural gas and synthetically from heavy oils, and in obtaining many special products from crude oils.

A four-page bulletin, issued by the Independent Pneumatic Tool Co., Chicago, is devoted to this company's line of piston air drills, pneumatic hammers, wood boring drills, portable air grinders, screw feed drills and other pneumatic tools.

British Pig Iron Slowly Improves

Plenty of room for improvement in finished materials

—Orders from United States

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 21.

The position of pig iron is slowly but surely improving. This is due partly to some intervention of speculation; but that in itself is a sign of greater confidence. Yesterday's quotation at Cleveland was 51s 6d ($12.60), with an additional 4d (8 cents) for one month and 8d (16 cents) for two months. Buyers show more desire to supply their forward needs, but business still hangs fire, owing to the determination of makers to obtain substantial advances for long contracts. An end has now been made of price-cutting, makers being in a position to hold the market until buyers come round to their views. There has been a little increase in Cleveland stock, which now stands at 136,000 tons, but this is too trifling to arouse concern. Shipments for the month are 33,000 tons or about 5,000 better than for the same period in January. The weakest department is forge iron, which still lags both in South Staffordshire and in Lancashire; but furnaces generally are in a position to wait until buyers have made up their minds. A fair amount of hand-to-mouth business goes on. In steel-making material there has been an improvement, owing to the very large commitments of the steel works. East Coast hematite is now 63s ($15.30) at the furnaces, with an addition of 1s (24 cents) to 2s (48 cents) for forward delivery. The whole supply of steel-making iron is going into immediate consumption. Consumers are gradually deciding that cheaper material, either in pig iron or billets, is not to be looked for, and substantial contracts are sure to be put through during the next week or two. West Coast brands are also firmer. Consumers there are holding off the market as long as possible, but they cannot prevent prices slightly advancing. The smelters have derived a little relief from a slight reduction in the price of coke, while sharing also in the wage reduction decreed under the last return of the wages board. The continued activity in the steel trade arouses expectations of higher prices for hematite.

The condition of the finished iron and steel trade still leaves a good deal to be desired. In the Birmingham district the iron trade has failed to realize its promise of a month ago, and unmarked bars have receded by about 2s 6d (60 cents) per ton, so that is is possible to buy them delivered in Birmingham at £6 15s ($33.06) while some makers shade these prices. This means, of course, that the makers have already handed over to the buyers the whole advantage of the recent wage reduction. For common nut and bolt iron quotations range from £6 7s 6d ($31.22) to £6 10s ($31.82). But, generally, the Shaffordshire mills are not making more than four days a week. There is an absence of heavy contracting, but hand-to-mouth business makes a fairly large total, especially as country buyers are still coming along fairly well with their orders. Wire is a little easier in price, and the same may be said of galvanized sheets, which can be bought at £11 ($53.86) per ton, a rate from 2s 6d (60 cents) to 5s ($1.22) below recent quotations.

The market has suffered a good deal from some heavy failures of South American merchants, and it is feared that in this line, worse has still to come. Birmingham is a great exporting center of material for South America; but the long credits which have to be given make this a very risky kind of business. On the whole, the volume of sheet business keeps up very well, and it is evident that troubles confronting the market are mainly due to over-production and the constant intervention of new mills into the field, which for some years past has been a conspicuous feature of the sheet trade.

Foreign Influence

For some reason, Germany and Belgium are still under a cloud of depression. This effectually prevents an immediate revival in British markets. A very significant event this week has been a further development of the revolt among shipbuilders against the steelmakers' rebate system. This has now been in operation since October, 1911, and it consists in the repayment to buyers of British steel of 5s ($1.22) per ton for every ton purchased. Consumers protested at the time, but the makers then held a commanding position, and had their way. The Scottish steelmakers in November were obliged to abandon the rebate in their district owing to the tremendous amount of Belgian and German competition. This week three of the largest English shipbuilders on the North-East Coast have declared their intention of breaking away from the ring and buying in the open market. The intention is, of course, to take advantage of the enormous quantities of cheap bars and plates, which can be got from the Continent. At the present time finished Belgian bars can be bought, delivered in Birmingham, at £5 2s 6d ($25.60), a figure far below anything that British steelmakers can touch. The above-named shipbuilders have already arranged for large quantities of German plates and angles to be imported to certain shipyards on the Tyne and Wear.

The Germans and the Belgians have once more become most formidable competitors for business.

In Sheffield the armament works are benefiting by some valuable business placed by the United States navy department in turbine machinery and projectiles. It is recognized here that these orders were partly influenced by the desire of the American government to break through the monopoly of such business by American manufacturers. A great amount of interest is taken in Sheffield in the action pending in the American courts against Hadfields Ltd., with a view to restrain the Sheffield firm in the manufacture of a certain make of projectile. It is believed in Sheffield that this is a forerunner of other actions intended to shut the American market from the competition of Sheffield and other British makers of projectiles. Sheffield is very well situated at present in respect to foreign business. In that great steel center an expansion is expected during the next few months, and several extensions of plant are still in progress. Very large orders have this week been placed for railway material, tools, files, etc. Unemployment at Sheffield is too trifling to cause any anxiety. Several local firms have this week received orders for rails and railway material aggregating a heavy tonnage, from the Argentine and Australia.

American chainmakers will be interested in an important development which is taking place in the Black Country chain trade. A new type of electric welder has lately been introduced into the chain trade for the making of small chains. It is capable of making 14 welds per minute, and the work is said to be cleanly and soundly done. A considerable number of such machines are being installed in that district for the making of small chains.

The Bridgeport Foundry & Machine Co., Bridgeport, Conn., has filed a preliminary certificate of dissolution with the secretary of state.

Makes Good Report

Lackawanna Steel Co.'s profits are larger

Profits of the Lackawanna Steel Co. during 1913, were among the largest of any single year in the history of the company, reaching from operations $2,755,883, which, with special profits, made the total for the year $3,023,084. In 1912, the profits from operations were $1,008,812, or an increase of $1,747,072 last year.

This highly satisfactory showing has been made public in a comparative statement of the income account for the past year, which has been issued prior to the regular annual report. Previously, reports had shown the company's profits for the first nine months of 1913 to be $2,864,399, indicating that in the last quarter there was a deficit of $108,516.

The company lost 441,569 tons in unfilled orders in the year. The tonnage figures by quarters during 1913 and at the close of the two years preceding, are as follows:

Dec. 31, 1913	185,427
Sept. 30, 1913	255,945
June 30, 1913	436,675
March 31, 1913	623,816
Dec. 31, 1912	626,996
Dec. 31, 1911	289,971

The comparative income account for the year is as follows:

	1913.	Increase.
Inc. from mfg. including inter., etc.	$5,418,499	$1,689,716
Other annual inc.	749,345	5,576
Total inc.	$6,167,844	$1,695,292
Int. on Lacka. Steel Co. bonds	1,749,753	*20
Balance	$4,418,091	$1,695,496
Sinking funds	452,189	*125,644
Depr. and ren.	1,210,019	74,069
Total deductions	$1,662,208	*51,574
Profit	2,755,883	1,747,072
Special profit on sale of capital assets of sub.	267,200	267,200
Total profit for year	$3,023,084	$2,014,272

*Decrease.

Agreement Ended

At the end of February, the wage agreement between owners of puddling mills in the Pittsburgh district and members of the United Sons of Vulcan terminated. The Sons of Vulcan are receiving a flat rate of $6 per ton in the three plants at Pittsburgh. The same rate is paid by owners of mills that recently resumed operations under open shop conditions. This rate is $1 per ton higher than that demanded by the Sons of Vulcan last July, when the refusal of mill owners to consent to the $7 scale resulted in a strike officially ended only ten days ago. The $6 obtained by members of the Sons of Vulcan is 15 cents higher than the rate obtained by the Amalgamated Association of Iron, Steel and Tin Workers, after the last bi-monthly examination of actual selling averages of bar iron.

Owners of mills formerly controlled by the United Sons of Vulcan, now operating under open shop policies, say they do not yet know how they will provide for future changes in the puddling rates.

Openings in Europe

As a result of a recent extended journey, Dr. Robt. Grimshaw writes that he sees openings in Europe for the following:

Jacquard machines for punching locomotive and car side frames, and bridge members; machines for finishing die-forged railway-car disk buffers; wire-drawing and nail-making machines; flexible spiral wire coils for bending copper pipes; machines for slotting and turning crank axles; power laundry machinery.

I would be glad to put manufacturers in touch with the possible purchasers, if they are ready to quote c. i. f. Hamburg, with definite charges for boxing to customers who can give good New York references.

Will Build a Bridge

At a meeting of the trustees and officials of the Cincinnati Southern railroad, which was held at Cincinnati recently, it was decided to proceed with the building of a new bridge across the Ohio river at Cincinnati, to replace the present one. The old bridge is too light to accommodate the heavy loads of present-day trains, as it was built when engines and cars were much lighter than they are today. The new structure will be of the steel truss type and will have a double track. Its estimated cost will be about $2,000,000. The tonnage of steel required has not been determined, as the plans and specifications have not been prepared, but engineers are working upon them and expect to have estimates ready within the near future. Work upon the bridge proper will not be begun before a year.

Will Move.—The Ideal Steel Wheel Co., Winton place, Cincinnati, will move its business to Elkhart, Ind., within the near future. Preliminary plans for the transfer have been arranged. The company manufactures a steel wheel for automobiles, and is changing its location in order to be near to the center of the automobile industry.

The Best Year

In its history enjoyed by Baldwin Locomotive Works

With total sales of $37,630,969, compared with $28,924,335 in 1912, the Baldwin Locomotive Works in 1913 enjoyed the most prosperous year in its history, according to the annual report, just issued. The bonded interest amounted to $4,017,800 and dividends to $1,800,000, leaving undivided profits of $2,217,800. This brings the total surplus of the company as of Jan. 1, 1914, to $4,887,791, the largest in its history.

The total sales of the Standard Steel Works Co., Burnham, Pa., a subsidiary of the Baldwin Locomotive Works, in 1913, amounted to $6,821,594 and the net profits were $745,652. Out of these profits, $200,000 for bonds which have been cancelled and $525,000 for dividends, have been taken, leaving the surplus for the year $20,652, and the total accumulated surplus, $483,869.

President Alba B. Johnson, of the Baldwin Works, in his report, states that orders early in 1913 were sufficiently large to provide a satisfactory volume of work throughout the first nine months. Business during the final three months fell off sharply and the volume of orders carried over into 1914, was small, but prospects for early improvement are promising. During the year, the foundations for the new shops of the company at East Chicago were constructed.

Iron and Steel Institute

The annual meeting of the Iron and Steel Institute will be held at the Institute of Civil Engineers, Great George street, Westminster, London, May 7 and 8. The Bessemer gold medal will be awarded to Edward Riley, F. C. S. The annual dinner will be held in the Connaught Rooms, Great Queen street, W. C., Thursday, May 7. The autumn meeting will be held at Paris, Sept. 18-23, 1914, by invitation of the Comite Des Forges de France.

The Witherow Steel Co. has opened a plant in West Carson street, Pittsburgh, for the manufacture and distribution of material for reinforced concrete work. The site formerly was occupied by the Stoner-Thaw Co. The company will carry a line of cold twisted bars, rounds, squares, lath, form wire, expanded metal, etc. W. P. Witherow, formerly of the firm of Irvin & Witherow, engineers, is president.

TIPS FOR NEW BUSINESS

In New York, small inquiries for machinery continue to come out, but the situation generally does not reflect any change from last week. On the whole, the month of February has been quiet and the volume of business booked did not show much change from January. Included in the business carried over into March are the Union Pacific, Atlantic Coast Line and Grand Trunk railroad lists. Bids are now in on most of these requirements, but no assurance has been given as to when orders will be placed. Buyers continue to take second-hand machinery in preference to new. Demand from abroad for American machinery is now rather slack.

In Pittsburgh, machine tool dealers experienced a slight improvement in underlying conditions in February, and the month just ended was far better than the initial month of the year; it will be recalled, however, that business in January was decidedly light and unsatisfactory. General market conditions apparently had an unfavorable influence upon this particular branch of the trade the last seven days, as there seems to have been further delay in closing transactions expected to culminate before March 1. There is no change in the situation for heavy rolling mill machinery; plants continue to operate on contracts placed some time ago.

In Chicago, the situation remains quiet, with comparatively few orders, and these mostly for single tools. An inquiry from the Chicago & Western Indiana railroad is pending, which includes a considerable number and on which the trade at present is figuring.

In Cincinnati, a few machine tool manufacturers report better business, but the large majority state that conditions are unchanged and that orders are for single tools from domestic users. Light machinery is selling in excess of the heavier type, and a large amount of the former is being used to equip garages and repair shops. Foundries in Cincinnati are very inactive, and in some cases are barely operating. Woodworking machinery and electrical equipment are selling in fair lots only. Special machinery, such as mixing, laundry, and sugar machinery, is the best in demand. Second-hand machinery does not show any improvement, and has been unsatisfactory for a long time.

EASTERN STATES

BOSTON.—Charles Motor Co. has been incorporated; $25,000; by Virgil A. Charles, Roland H. Sherman, Winifred B. Kittredge.

BOSTON.—Woonsocket Machine & Press Co. has been incorporated; $150,000; by Francis J. Callahan, Herman A. Dolbeare, John J. Cloakley, Walter F. Lawton, Phillip H. Suter.

BOSTON.—Bellare Automatic Train Stopping Machine Co. has been incorporated; $50,000; by Antonio Bellare, Emanuel Lopresti, et al.

SALEM, MASS. — The Brown-Talbot Co. has erected a new three-story plant to replace the structure which was burned last fall.

NEW HAVEN, CONN.—The Acme Wire Co. is to build a 2-story, 60 x 400-foot addition.

BROOKLYN.—Acorn Insulated Wire Co. has been incorporated; $200,000; by W. V. Donovan, Jos. Quittner, J. T. McMahon, 27 William street.

NEW YORK CITY.—Howard H. Williams, of 31 Nassau street, has been appointed temporary receiver of the Standard Plunger Elevator Co., of 115 Broadway, New York City, as result of a bankruptcy suit instituted by Geo. B. Smith, a creditor for $12,000. Mr. Smith in his petition for receiver, states that the company is financially embarrassed and "practically insolvent". He alleges that the liabilities amount to $350,000. The attorneys for the company consented to the appointment of a receiver but assert that the company is solvent. They place the liabilities at about $350,000 and the quick assets at slightly less but state that the total assets amount to about $500,000.

NEW YORK CITY. — Hamilton Kerosene Carburetor Co. has increased its capital stock from $150,000 to $250,000.

NEW YORK CITY.—Platt Iron Works has been incorporated; $10,000; by A. S. Campbell, J. Ferguson Jr., R. S. Holmes, 54 Wall street.

ROCHESTER, N. Y.—Rochester Gas Appliance Co. will soon erect a $55,000 brick block on the corner of Windsor and Main streets.

ROCHESTER, N. Y.—The Rochester Case Hardening Co. has been incorporated; furnaces, steel hardening; $10,000; by W. H. Allen, G. J. Schaffer, J. A. Schmey.

SYRACUSE, N. Y.—Ground will be broken in the spring for the $15,000 flatware factory addition for the Benedict Mfg. Co.

ALLENTOWN, PA.—The $25,000 foundry and machine shop addition to the plant of William F. Mosser & Son is nearly completed.

ALTOONA, PA.—The Bellwood Mfg. Co. contemplates moving here from Bellwood, Pa. In that event it will erect a $70,000 steel mill and employ 300 men.

BRACKENRIDGE, PA.—The West Penn Steel Co. has ordered a 15-ton crane, with lifting magnet, for its scrap yards and a 20-ton mill type crane for its open-hearth steel department, from Manning, Maxwell & Moore, Inc., New York.

MONESSEN, PA.—The Pittsburgh Steel Co. plans to install an iron-ore sintering plant at its new blast furnaces here. Two Greenawalt furnaces, each having a capacity of 40 tons of fine ore a day, will be built.

ORBISONIA, PA.—The East Broad Top Railroad & Coal Co., E. C. Hall, general manager, advises that it is in the market for a second-hand, 70-foot turn table and for about 200 tons of 70-pound relaying rails.

PHILADELPHIA.—United States Hardware Mfg. Co. has been incorporated; $5,000; by H. D. Mousley, Charles J. Waugh and C. C. Hocker, Philadelphia.

PITTSBURGH.—The Braddock Electric Machine Co. will be incorporated by W. J. Nowotny, Anne Nowotny, P. D. Remington.

PITTSBURGH.—Royal Calculator Co. has been incorporated; $20,000; by C. G. Lintner, E. M. Beals and E. B. Jenkins, Pittsburgh.

PITTSBURGH. — The Pittsburgh Crucible Steel Co. has purchased an island opposite its plant at Midland, Pa. The property will be used for a dumping ground.

WASHINGTON, PA.—Contract for the extension of the Pennsylvania line from Burgettstown to the works of the Washington Coal Co., Cedar Grove, has been awarded to the Furgeson Contracting Co.

NEW BRUNSWICK, N. J.—The State of New Jersey will erect an addition to the experiment station at a cost of $100,000.

NEW BRUNSWICK, N. J.—Johnson & Johnson, surgical instrument manufacturer, has increased its capital stock from $3,250,000 to $4,900,000.

TRENTON, N. J.—The Standard Screw Co. has increased its capital stock from $4,500,000 to $6,500,000.

TRENTON, N. J.—The State of New Jersey will erect two more buildings at the State Home for Girls at a cost of $50,000; the contract for iron work has not been let.

WASHINGTON.—Bids will be received until 3 p. m. March 26, at the treasury department for installing a mail chute in the United States Custom House, Boston, Mass.

CENTRAL STATES

ASHLAND, O.—The Ashland Foundry Co. has increased its capital stock from $15,000 to $20,000.

BELLEFONTAINE, O.—The Bellefontaine Bridge Co. has the contract for the 50 x 100-foot steel tank factory addition to the Donovan Boiler Works of Parkersburg, W. Va. The latest equipment will be used.

BELLEFONTAINE, O.—Contracts have not been awarded for the power equipment for the electric lighting plant. Larrowe Construction Co. bids $35,000; Joseph L. Skelton Co. bids $23,693.

CANTON, O.—O. C. Barber, who has an electric power plant here, hopes to obtain the

same rights in Howenstein, Alliance, New Philadelphia and Massillon.

CINCINNATI.—The Western Water Motor Co., Hamilton, O., has been incorporated with a capital stock of $15,000, to manufacture water motors. Among the incorporators are Nelson Williams, C. G. Morey and I. C. Baker.

CINCINNATI.—Bids are still to be received for a vacuum cleaning plant, refrigerating plant and incinerators for the contagious building of the City Hospital, Cincinnati. Samuel Hannaford & Sons, architects, of Cincinnati, are in charge of the erection of this building.

CINCINNATI. — The Boss Washing Machine Co. has commissioned E. H. Dornette, architect, of that city, to prepare plans for a new fireproof factory building, which will be erected in Norwood, a suburb. The structure will be 120 x 160 feet, and three stories in height. Including equipment, the plant will cost about $100,000.

CINCINNATI. — The Cincinnati Fireproof Door Co., Cincinnati, has been incorporated with a capital stock of $15,000, to manufacture fireproof doors. The company took over the business of the J. K. Nickerson Co. two months ago, which manufactured fireproof doors, hoisting apparatus and electrical machinery. A plant has been secured at Western avenue and Bank streets, Cincinnati, which was formerly occupied by the Hauser, Brenner & Fath Co. C. J. Mees, Cincinnati, is the active head of the Cincinnati Fireproof Door Co.

CLEVELAND.—The A. R. Duncan Jr. Co. will erect a $75,000 cold storage building at 741 Central avenue S. E.

CLEVELAND.—The Cleveland Railway Co. has applied to the Ohio Public Utilities Commission for authority to issue $2,848,000 new capital stock at par for equipment and extension of its lines.

CLEVELAND.—H. Whitford Jones, electrical engineer, Citizens' building, has plans nearly ready for the proposed lighting system at Mansfield; he proposes to specify nitrogen tungsten lamps; complete plans ready early in March.

DAYTON, O.—The Dayton Power & Light Co. is about to issue $277,000 worth of stock for proposed improvements.

DAYTON, O.—The Apple Electric Co. instead of moving, will enlarge its plant here; it has consolidated with the Splitdorf Electrical Co., Newark, N. J.

GREENVILLE, O. — Greenville Electric Lighting Co. is increasing its capital stock $40,000 for line extensions; the company already operates plants in seven near-by towns.

HURON, O.—The board of trustees has awarded the contract for generators and switchboard equipment to the Ft. Wayne Electric Co. at $3,500; the contract for the three lighting fixtures goes to the Packard Electric Co., at $800.

LORAIN, O.—The Cleveland Ice & Machine Co. will vote March 10 on an increase in capital stock from $105,000 to $180,000.

LOUDONVILLE, O.—The city will repair its electric lighting plant and install additional machinery.

MANSFIELD, O.—The Cotter Transfer & Storage Co. has bought a site on West Third street for a storage building for household goods; modern equipment to include a large elevator will be installed.

SPRINGFIELD, O.—Harry S. Kisselman is appointed chairman of a committee to investigate the building of a municipal power plant.

SPRINGFIELD, O.—The Springfield Spring Co. will purchase the Owen Machine Tool Co. and increase its capital stock from $25,000 to $60,000; some equipment will be needed.

UPPER SANDUSKY, O.—The city council has voted to issue $25,000 lighting plant bonds; no engineer has been engaged.

YOUNGSTOWN, O.—The city council next week will vote on employing an expert engineer to draw plans and recommend a suitable lighting system.

HUNTINGTON, W. VA.—A Pittsburgh syndicate, headed by C. B. Lawton, is negotiating for the plant, site and machinery of the Independent Steel Co. of America, Huntington, W. Va., with the intention of turning it into a glass brick factory.

INDIANAPOLIS.—The Hercules Electric Co. has been incorporated; $25,000; by Katherine Blake Kurtz, S. H. Kurtz, et al.

INDIANAPOLIS.—The Frazier Stove Works is making arrangements to move its business here from Anderson, Ind.

INDIANAPOLIS. — Wm. H. Jungeclause Co., 825 Massachusetts avenue, has a general contract for a store and office building for the Wemmer estate, 34 Illinois street, brick and steel, two stories.

INDIANAPOLIS.—The Automatic Gas Motor Co. has been incorporated to either erect a factory or grant shop licenses for a patent automatic gas motor; $200,000; by Fred B. Whitlock, Harvey Bates Jr., H. F. Campbell, C. W. Hackleman, E. E. Stafford and H. H. Fulton, all of Indianapolis.

SOUTH BEND, IND. — Fryermouth & Maurer, Warner building, have plans for a store building of brick and steel, three stories, 44 x 80, for the Shivley & Horner estate.

CHICAGO.—The Excelsior Motor Mfg. & Supply Co., Cortland street and North Lawndale avenue, has plans ready for a plant to cost about $450,000.

CHICAGO.—Eugene Brown, 808 East Fifty-fourth street, has plans for a flat building, containing 36 apartments, to cost $150,000. Steel beams and columns are specified.

CHICAGO.—Marshall & Fox, architects, are drawing plans for a 12-story hotel at North avenue and Dearborn Parkway, for Fred Bode, president of Gage Bros. & Co.

CHICAGO.—H. L. Newhouse, 4630 Prairie avenue, architect, is taking bids for Roseland theatre, the building to contain offices and stores; $100,000; 3-stories, 100 x 120.

CHICAGO.—Roberts & Schafer has taken a contract from the Bessemer & Lake Superior Railroad for a 400-ton reinforced concrete coaling station, with Holmen type bucket, at Branchton, Pa., at $25,000.

CHICAGO. — A. S. Coffin, architect, 64 West Randolph street, is taking bids for a warehouse and mill for the Carter White Lead Co., Fred M. Carter, president, brick and reinforced concrete, 3-stories, 60 x 235 feet.

CHICAGO. — Hansell Elcock has been awarded the structural steel, miscellaneous iron and ornamental metal for a convent for the Little Sisters of the Poor, 2348 Sheffield avenue.

CHICAGO.—The Guaranty Wire & Iron Co. has been incorporated to conduct an ornamental iron works; $10,000; by Wm. A. Galvin, Richard J. Ross, John E. Schmidt, 1618 N. Spaulding avenue. This is a going concern.

CHICAGO.—Frank J. Lochen Co. has been incorporated to manufacture and sell ventilating and heating systems; $2,500; by Frank J. Lochen, M. F. Ryan; W. J. Lewis, 4112 W. North avenue.

CHICAGO.—Merchants Motor Truck Mfg. Co. has been incorporated to manufacture and sell motor trucks, motor vehicles, autos, etc.; $100,000; by Wm. Schulze, Jos. W. Mlsek and Clayton A. Martin, 3321 Palmer street.

CHICAGO.—Alfred S. Alschuler, architect, 28 E. Jackson boulevard, has prepared plans for a 12-story hotel building costing $350,000, to be built for Irving Shuman, assistant U. S. treasurer, at Randolph street and Fifth avenue. The structure will be 60 x 100 feet.

CHICAGO.—The Anchored Non-Skid Chain Co. has been incorporated to take non-skid devices for automobiles and machinery; $5,000; by Elmer F. Pond, Mathew J. Lynch and Granville Semmens, 1409 South Michigan avenue.

ELGIN, ILL.—This city will spend $81,000 on a municipal lighting plant; address John S. Russell for specifications.

EVANSTON, ILL.—Bishop & Co., architects, are preparing plans for a 4-story family hotel of 129 rooms, for Fred C. Lewin of Nelson & Lewin.

PEORIA, ILL.—Carr & Adams Co. has increased its capital stock from $25,000 to $50,000 and changed its name to Carr-Johnston Co.

ROCK ISLAND, ILL.—L. S. McCabe & Co. has increased its capital stock from $200,000 to $300,000.

STERLING, ILL. — The Sterling Foundry Co. has obtained a full settlement with the insurance company, and the work of rebuilding is in progress. The new building will be fireproof.

BATTLE CREEK, MICH.—The United Steel & Wire Co. has increased its capital stock from $25,000 to $60,000; W. S. Keet, president; J. Genebach, manager, and N. S. Potter, of Jackson, treasurer, are making plans for enlarging.

BAY CITY, MICH.—Michigan Light Co. has been incorporated; $3,000,000; by William H. Barthold, Carl Wilcox, James A. Brown.

DETROIT.—The Michigan Safety Furnace Pipe Co., was recently damaged by fire. Loss about $40,000.

DETROIT.—Russel Wheel & Foundry Co. has the contract for the steel to be used in the one-story brick and steel factory building for the General Aluminum & Brass Mfg. Co., to be erected at East Grand boulevard and St. Aubin avenue.

LANSING, MICH.—The Lansing Connecting railroad has been incorporated; $50,000; by J. H. Moores and J. W. Potter. The company will establish unbroken connections between the Pere Marquette, Michigan Central, Grand Trunk and Lake Shore railroads by way of the Michigan Central in Lansing; it also holds 60 acres of land here which it will offer as factory sites.

SAULT STE MARIE, MICH.—The Seelye Combination Axe & Tool Co., recently incorporated, is to build a factory immediately.

VESTABURG, MICH.—The Alma Illuminating Engineering Co. plans to erect a power plant on Pine river near Riverdale. Arrangements have been made for a pole line to carry the current to Vestaburg, Riverdale, Elm Hall, Sumner, Cedar Lake, and possibly to Edmore and Alma.

ALGOMA, WIS.—Joseph Wodseladek, manufacturer of feed cutters and gasoline engines, is enlarging his facilities and adding some new tools, including boring mill, radial mill, screw machine, etc. His output has been 250 feed cutters and 200 engines annually.

APPLETON, WIS.—The Citizens' National Bank is about to select an architect to plan the proposed new $100,000 bank and office building, to be 52 x 82 feet, 4-story and basement, with a complete new equipment of safes, vaults and safe deposit vaults.

ASHLAND, WIS.—Henry Wildhagen, architect, Ashland, and Herman W. Buemming, architect, Milwaukee, have been selected to draw plans for the proposed new $125,000 Ashland county courthouse.

ELDORA, WIS.—Wisconsin Light, Power & Milling Co. has been incorporated; $10,000; by O. A. Heulsman, A. H. Grenrich and L. F. Lurvey.

FOND DU LAC, WIS.—The Frost Mfg. Co., Evansville, Wis., was awarded a contract for constructing an electric lighting plant for the

Sander Brewing Co. and the Albert and Edward Sander farms and homesteads.

FOND DU LAC, WIS.—The Hersey Meter Co., Boston, received the contract for supplying all water meters required by the municipal water works department of Fond du Lac during 1914.

FOND DU LAC, WIS.—The Harris Typewriter Co. has increased its output to 25 typewriters daily and intends to further increase its facilities about the middle of the year to meet the demand under its contract with Sears, Roebuck & Co., Chicago, for its entire output.

GRAND RAPIDS, WIS.—Agitation has been started for the construction of a $75,000 highway bridge over Wisconsin river on the Biron road.

GREEN BAY, WIS.—Grelling Bros. Co. is low bidder on a bascule bridge across Fox river, at $152,312.

GREEN BAY, WIS.—The Northern Paper Mills Co. awarded the contract for constructing a new mill building, 80 x 160 feet, two stories, to the Worden-Allen Co., Milwaukee. The Beloit Iron Works, Beloit, Wis., received the contract for a 112-inch Fourdrinier paper machine and appurtenances.

MANITOWOC, WIS.—The E. Stupecky Co. has been organized by Edward Stupecky, Leonard Zielsdorf and Edward Warren, former employes of the Manitowoc & Northern Traction Co., and established a shop at 1208 Washington street to build, rebuild and repair electric motors, equipment and devices.

MARINETTE, WIS.—The Christensen Mfg. Co., of Menominee, Mich., opposite Marinette, has sold its output for five years to John M. Hartnett and P. T. Tivy, of Chicago, and will increase its manufacturing facilities to meet the demands of the contract, which calls for 7,000 account registers. It is likely that arrangements will be made for the establishment of a branch plant in Canada. T. C. Christensen is president.

MILWAUKEE, WIS. — Fire, Feb. 25, almost completely destroyed the buildings of the Sheriffs Mfg. Co. The loss is about $20,000.

MILWAUKEE.—The common council has adopted an ordinance providing for the issue of $150,000 in municipal bonds for the construction of the proposed new bascule bridge over Milwaukee river at State street, and F. G. Simmons, commissioner of public works, is preparing to call for bids.

MILWAUKEE. — The Universal Machinery Co., Nineteenth and St. Paul avenue, which engaged in the manufacture of small gasoline engines for cyclecar and motorcycle use some time ago, intends to erect a new shop building at once, because of the heavy bookings for this class of material. Additional facilities are made imperative by the encroachment of the gas engine business on other departments. E. C. Devlin is general manager.

POUND, WIS.—The Coleman-Pound Light & Power Co. will be incorporated; $10,000; to operate an electric light plant.

SHEBOYGAN, WIS.—The Twig Shoe Co. has commissioned W. C. Weeks, architect, Sheboygan, to prepare plans for its new shoe and boot factory, to cost about $30,000. It will be 40 x 80 feet in size, 3-story, of fireproof construction, with separate power plant.

ST. LOUIS.—Western Wire Products Co. has been incorporated; $75,000; by Ira J. Young, Harry M. Young, Alvin L. Bauman, Emil Hausman, et al.

ST. LOUIS.—The Steininger Taylor Construction Co., 407 North Eighth avenue, has the general contract for the administration building of the Masonic home to cost $100,000, brick and re-inforced concrete, 78 x 80 feet, four stories.

DES MOINES, IA. — The Thompson Mfg. Co. has been organized to manufacture frictionless vacuum cleaners.

FT. DODGE, IA.—E. Gray & Co. is the name of a new firm which will operate an acetylene welding plant in quarters just east of the Iowa Foundry.

KNOXVILLE, IA.—Bids will be received until March 10 by J. D. Shlotterback, county auditor, for 90 reinforced concrete culverts and eight small steel bridges.

MARSHALLTOWN, IA.—The Lennox Furnace Co. has asked for bids for a plant in this city. Plans have been made by W. S. Ferguson Co., Euclid avenue, Cleveland.

DULUTH.—The Duluth Welding & Mfg. Co. has been incorporated; $50,000; to conduct a tool manufacturing business; by John A. Keyes, president; C. R. Keyes, secretary-treasurer; J. C. H. Engel, vice president.

MELROSE, MINN.—The Hennepin Bridge Co., Minneapolis, has the general contract for a steel bridge, 100-foot span, 16-foot roadway, for the city of Melrose. F. J. Weiser, city clerk.

MINNEAPOLIS.—Erle D. Luce, president Electric Short Line, Phoenix building, is taking bids for a station and office building, ten stories, to cost $700,000.

ST. PAUL.—Otto W. Raths, manager Gayety Theatre, is having plans prepared by the Toltz Engineering Co., 1416 Pioneer building, for a brick and steel theatre, two stories, to cost $60,000.

THIEF RIVER FALLS, MINN. — The Thief River Falls Iron Works has been incorporated; $25,000; is to build plant at once.

SOUTHERN STATES

SALISBURY, N. C.—J. P. Hughey and Chas. Sommers have bought the foundry at North Wilkesboro, and will move there and operate it.

BIRMINGHAM, ALA.—E. T. Beatty's 2-story brick machine shop, 1101 Avenue B., was recently damaged by fire to the extent of about $3,500; insurance covers loss.

DALLAS, TEX.—The Dallas Union Terminal Co. has given a contract to Jones, Stewart & Co., New York, for the new Union station. The company has sold $2,000,000 in bonds to cover the cost of the first part of the work.

WESTERN STATES

GREAT FALLS, MONT.—Bids will be received at the U. S. Reclamation Service offices until Mar. 9 for furnishing and erecting metal flumes involving 7,357 of from 2-foot 6½-inch to 14-foot flumes, and the erection of 3,050 linear feet of 8-foot 3¼-inch flume.

IDAHO FALLS, IDAHO.—The Oregon Short Line railroad is reported to begin work this spring on an 82-mile loop through Iona to St. Anthony and Elgin Beach by way of Monan.

POCATELLO, IDAHO. — Work will start about May 1 on the $200,000 Oregon Short Line depot.

CENTRALIA, WASH.—Stanley Macomber, city engineer, says this city will need three-fourths of a mile of cast iron feed pipe for the proposed reservoir.

KIRKLAND, WASH.—The sale of $18,000 water system bonds has been made.

NORTH YAKIMA, WASH.—Appropriations by the Interior department including $190,000 for pumping plant machinery and $100,000 for distribution system for pumping plant unit Sunnyside project, have been authorized.

PORTLAND, ORE.—The Port of Portland will build a 150-foot tug with 50-foot beam, triple expansion 2,000-horsepower engine, two Scotch marine boilers, wrecking pump and 15-ton lifting power steel boom.

PORTLAND, ORE.—A. Welsh has purchased the Yaquina Electric Co.'s plant at Newport and secured water rights on the Siletz river in Lincoln county. It is reported that Mr. Welsh will construct a 2,500-horsepower, $150,000 hydro-electric plant to furnish electricity and power to Newport and surrounding country.

LOS ANGELES.—The San Pedro Foundry & Machine Co. is making arrangements for a $25,000 foundry and machine shop; it will establish machine and repair shops, a boat building plant and marine railway.

RENO, NEV.—The Red Metals Mining Co. is to build a 20-ton reverberatory furnace to cost about $7,000.

TRADE NOTES

BEAVER DAM, WIS.—Lawrence Fitch, of Milwaukee, who recently purchased the properties of the Beaver Dam Malleable Iron Co., bankrupt, at receiver's sale, is rapidly re-opening all departments. The new owner has recently renewed several large railroad contracts, including a large requirement for tie plates and other railroad malleable for the Harriman system, and it is expected that all departments of these works in Beaver Dam will be in full operation by the middle of March. It is stated that new bookings already in hand insure a continuous run for more than twelve months.

DAYTON, O.—A small amount of equipment will be needed by the Apple Electric Co., which will soon enlarge its plant. The company manufactures automobile specialties.

GRAND RAPIDS, MICH. — The Johnson Wright Furniture Co. is considering a proposition of locating in Cincinnati. The company is capitalized at $2,000,000, and will need some new equipment, if the change is made. Negotiations are now pending the leasing of the former plant of the J. F. Dietz Mfg. Co., on Third street, Cincinnati.

LOMAX, ILL.—The Howell-Gilmore Mfg. Co. is the successor of the Springfield Harrow Mfg. Co., formerly located at Springfield, Ill.

KAUKAUNA, WIS.—S. I. Norton, vehicle and implement manufacturer, Kaukauna, has purchased the stock, equipment, tools and business of the Appleton Steel Plow Co., Appleton, Wis., and is consolidating the works with the local shops.

LANCASTER, PA.—B. H. Snavely and Walter W. Posey have been appointed receivers of the Lancaster Iron Works, their bond being fixed at $50,000. This action was taken as a result of proceedings instituted by the First National Bank of Lancaster. The company is believed to be solvent, but lawsuits involving large sums of money are pending or threatened and this action has been taken to prevent the issuance of separate executions in order that the assets may be conserved. The company operates two plants in Lancaster. Its officers joined in asking for the receivership.

NEW YORK CITY.—The Pittsburgh Steel Co., which removed its distributing depot from New York City three years ago, has leased warehouse room in that city from the Merchant & Miners' Transportation Co.

OKLAHOMA CITY, OKLA.—The Boardman Co. has absorbed the Wylie Mfg. Co., of the same place, stockholders and management remaining the same. The Wylie Mfg. Co. has handled contractors' and road-making machinery, equipment and supplies, while the Boardman Co. has been making metal silos, tanks, smoke stacks, etc.

SPRINGFIELD, ILL.—The Illinois Culvert Co. has been absorbed by the Baker Mfg. Co., of the same city, which will add corrugated steel culverts to its regular line of contractors' supplies and road-making machinery.

TROY, N. Y.—Stockholders of the Troy Wagon Works will vote on increasing its capital stock from $800,000 to $1,600,000. Additional capital is necessary to take care of the increased business.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(First half delivery.)

Bessemer, valley	$14.25
Bessemer, Pittsburgh	15.15
Basic, Pittsburgh	14.15
Basic, Philadelphia	14.25 to 14.50
Malleable, Pittsburgh	14.15 to 14.40
Malleable, Chicago	14.25
Malleable, Philadelphia	15.25 to 15.50
No. 2 foundry, Pittsburgh	14.15 to 14.40
No. 2 foundry, Cleveland	14.00 to 14.25
No. 2 foundry, Cincinnati	14.20 to 14.70
No. 2 foundry, Chicago	14.25
No. 2X foundry, Philadelphia	14.85 to 15.25
No. 2X foundry, New York	14.75 to 15.25
No. 2X foundry, Buffalo	13.25 to 13.50
No. 2 plain, Philadelphia	14.50 to 14.75
No. 2 plain, New York	14.50 to 14.75
No. 2 plain, Buffalo	13.00 to 13.25
No. 2 southern, Birmingham	11.00 to 11.50
No. 2 southern, Cincinnati	13.75 to 14.25
No. 2 southern, Chicago	14.85
No. 2 southern, Philadelphia	14.75 to 15.00
No. 2 southern, Cleveland	15.00 to 15.35
No. 2 southern, New York	14.75 to 15.25
No. 2 southern, St. Louis	14.50 to 15.00
Virginia, 2X, Philadelphia	15.55 to 15.80
Virginia, 2X, New York	15.85 to 16.10
Gray forge, Pittsburgh	13.65 to 13.90
Gray forge, Birmingham	10.25 to 10.75
Silveries, 5 per cent, Cleveland	17.30 to 17.55
Silveries, 5 per cent, Birmingham	12.50
Silveries, 5 per cent, Chicago	16.85
Silveries, Jackson county	16.00 to 16.50
Standard low phos., Phila.	21.00 to 21.25
Lebanon low phos., furnace	17.00 to 17.50
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.50
Charcoal, Buffalo	15.75 to 16.75
Charcoal, Birmingham	25.00
Middlesbrough, No. 3, Phila., ex ship	15.00 to 15.25

FERRO-ALLOYS

Ferro-manganese, Baltimore	$39.00 to 40.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent, Pgh.	22.90
Ferro-sil., 11 to 12 per cent, Pgh.	21.90
Ferro-sil., 10 to 11 per cent, Pgh.	20.90
Ferro-sil., 9 to 10 per cent, Pgh.	19.90
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

COKE

(At the ovens.)

Connellsville furnace	$1.95 to 2.00
Connellsville fur. contr.	2.00 to 2.10
Connellsville foundry	2.40 to 2.65
Connellsville fdy., contr.	2.50 to 2.75
Wise county furnace	2.00 to 2.10
Wise county foundry	2.50 to 3.10
Pocahontas furnace	2.15 to 2.40
Pocahontas foundry	2.50 to 2.75
New River, foundry	2.85 to 3.50
New River, furnace	2.50 to 2.75

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$4.40
Mesabi Bessemer, 51½ per cent	4.15
Old range, non-Bes., 55 per cent	3.60
Mesabi, non-Bessemer, 51½ per cent	3.40

(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	7 to 8c
Foreign non-Bess., 50 to 65 per cent.	7 to 8c

SEMI-FINISHED STEEL

Bes. billets, Pgh. and Yn.	$21.00
Open-hearth bil., Pbgh. and Yn.	21.00
Open-hearth bil., eastern mill	22.75 to 23.75
Forging billets, eastern mill	26.75 to 27.75
Forging billets, Pittsburgh	25.00 to 26.00
Wire rods, Pittsburgh	26.00 to 26.50
Bes. sheet bars, Pbgh. and Yn.	22.00
Op.-hearth sh. bars, Pbgh. & Yn.	22.00

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.20c to 1.25c
Structural shapes, Chicago	1.43c
Structural shapes, Philadelphia	1.30c to 1.40c
Structural shapes, New York	1.36c to 1.41c
Structural shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.38c to 1.43c
Tank plates, Pittsburgh	1.20c to 1.25c
Tank plates, Philadelphia	1.30c to 1.40c
Tank plates, New York	1.31c to 1.41c
Bars, soft steel, Pittsburgh	1.20c to 1.25c
Bars, soft steel, Chicago	1.38c to 1.43c
Bars, soft steel, Philadelphia	1.35c to 1.40c
Bars, soft steel, New York	1.36c to 1.41c
Shapes under 3 in., Pittsburgh	1.30c to 1.35c
Hoops, carloads, Pittsburgh	1.30c to 1.35c
Hoops, less carloads, Pittsburgh	1.45c to 1.50c
Bands, Pittsburgh	1.20c to 1.25c
Shafting, carloads, Pbgh., disc	63 to 65
Shaft'g, less carl'ds, Pbgh., disc	58 to 60
Bar iron, Chicago	1.20c
Bar iron, Philadelphia	1.22½ to 1.32½c
Bar iron, New York	1.25c to 1.30c
Bar iron, Cleveland	1.20c to 1.25c
Hard steel bars, Chicago	1.30c
Smooth finish'g mchy. steel, Chi.	1.68c
Cut nails, Philadelphia	1.80c to 1.90c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.95c to 2.00c
No. 28, black, Chicago	2.13c to 2.18c
No. 28, tin mill, black, Pbgh.	1.90c to 1.95c
No. 28, galvanized, Pbgh.	2.95c to 3.00c
No. 28, galvanized, Chgo.	3.13c to 3.18c
No. 28, cor. galv., Pbgh.	3.05c to 3.10c

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds, to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Denver	84½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, plates and shapes	80 cents

No. 28, painted cor., Pbgh.	2.15c to 2.20c
No. 10, blue annealed, Pbgh.	1.40c to 1.45c
No. 10, blue annealed, Phila.	1.60c to 1.65c
Tin plate, 100 lb., coke, base	$3.40

IRON AND STEEL PIPE

(Pittsburgh.)

	Black Butt-weld.	Galv.
Steel, ¾ to 3 inches	79½	71
Iron, ¾ to 2½ inches	70	61
	Lap-weld.	
Steel, 2½ to 6 inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	71
Iron, 3½ to 4½ inches	60

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.35c
Light rails, 8 lbs., Pbgh. or Chi.	1.40c
Lgt. rails, 12 lbs., Pbgh. or Chgo.	1.35c
Lgt. rails, 16 to 20 lb., Pbgh. or Chicago	1.30c
Lgt. rails, 25 to 45 lbs., Pbgh. or Chicago	1.25c
Relaying rails, standard, Chgo.	23.00 to 24.00
Relaying rails, light, Chicago	$21.50 to 22.50
Angle bars, st. sect. Pbgh., base.	1.15c
Angle bars, st., sections, Chgo.	1.50c
Spikes, railroad, Pbgh.	1.45c to 1.50c
Spikes, railroad, Chgo.	1.55c
Track bolts, Pbgh.	2.00c
Track bolts, Chgo.	2.00c

RIVETS

Structural rivets, Pbgh.	1.60c to 1.65c
Structural rivets, Chgo.	1.78c
Boiler rivets, Pbgh.	1.70c to 1.75c
Boiler rivets, Chgo.	1.88c

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

	Discount.
Carriage bolts, rolled thread, base	80 and 2½
Carriage bolts, cut thread, base.	75 and 17½
Mch. bolts, rolled, base	80 and 7½
Mch. bolts, cut, base	80 and 2½
Hot pressed nuts, rolled, base	80 and 7½
Hot pressed nuts, cut, base	80 and 2½
Lag screws, gimlet and cone pt.	80 and 20

WIRE PRODUCTS

Wire nails, jobbers, Pittsburgh	$1.60
Wire nails, retailers, Pittsburgh	1.65
Plain wire, jobbers, Pittsburgh	1.40
Plain wire, retailers, Pittsburgh	1.45
Galvanized wire, jobbers, Pbgh.	1.80
Galvanized wire, retailers, Pbgh.	1.85
Polished staples, Pbgh.	1.60
Galvanized staples, Pbgh.	2.00
Barb wire, painted, jobbers, Pbgh.	1.60
Barb wire, painted, retailers, Pbgh.	1.65
Barb wire, galv., retailers, Pbgh.	2.05
Barb wire, galv., jobbers, Pbgh.	2.00

CAST IRON PIPE

Four inch, water, Chicago	$26.00
Six to 12 inches, Chicago	24.00
Larger sizes, Chicago	23.50
Six inch, water, New York	$22.00 to 23.00
Four-inch, water, Birmingham	22.50
Six inch and larger, Birmingham	19.50
Gas pipe, $1 per ton higher than water.	

IRON AND STEEL SCRAP

(Net tons.)

No. 1 railroad wrought, Chgo.	$ 9.25 to 9.75
No. 1 railroad wrought, Cleve.	11.00 to 11.50
No. 1 railroad wrought, Pbgh.	11.40 to 11.90
No. 1 railroad wrought, Phila.	13.40 to 13.90
No. 1 railroad wrought, N. Y.	10.70 to 11.20
No. 1 railr'd wrought, B'm'gh'm	10.70 to 11.20
No. 1 railroad wrought, St. L.	9.00 to 9.50
No. 1 railroad wrought, Cinci.	8.75 to 9.25
No. 1 railroad wrought, Buffalo	10.70 to 11.20
No. 2 railroad wrought, Chgo.	8.75 to 9.25
No. 2 railroad wrought, Pbgh.	10.90 to 11.40
No. 2 railroad wrought, Phila.	12.90 to 13.40
No. 2 railroad wrought, N. Y.	10.20 to 10.70
No. 2 railroad wrought, Cleve.	10.50 to 11.00
No. 2 railroad wrought, Buffalo	10.20 to 10.70
No. 2 railroad wrought, Cinci.	8.25 to 8.75
No. 2 railroad wrought, St. L.	8.50 to 9.00
No. 2 railr'd wrought, B'm'gh'm	10.00 to 10.50
Arch bars and transoms, Chgo.	12.50 to 13.00
Arch bars and transoms, St. L.	12.00 to 12.50
Knuckles, coup. and spr'gs, Chgo.	9.00 to 9.50
Kunckles, coup., and spg's, St. L.	10.00 to 10.50
Shafting, Chicago	11.50 to 12.00
Shafting, New York	11.50 to 12.00
Shafting, St. Louis	13.00 to 13.50
Steel car axles, Chgo.	12.25 to 12.75
Steel car axles, Phila.	15.00 to 15.50
Steel car axles, New York	12.50 to 13.00
Steel car axles, Cleveland	14.00 to 14.50
Steel car axles, Buffalo	15.00 to 15.50
Steel car axles, St. Louis	13.00 to 13.50
Steel car axles, Birmingham	15.00 to 15.50
Locomotive tires, Chicago	10.00 to 10.50
Locomotive tires, St. Louis	10.00 to 10.50
Cut forge, Chicago	8.75 to 9.25
Cut forge, Philadelphia	8.00 to 8.50
Pipes and flues, Chicago	7.00 to 7.50
Pipes and flues, Philadelphia	10.00 to 10.50
Pipes and flues, Cleveland	8.50 to 9.00
Pipes and flues, New York	7.50 to 8.00
Pipes and flues, Buffalo	7.50 to 8.00
Pipes and flues, St. Louis	7.00 to 7.50
No. 1 cast, Chicago	10.00 to 10.50
No. 1 cast, Pittsburgh	11.00 to 11.50
No. 1 cast, New Jersey points	11.00 to 11.50
No. 1 cast, Cleveland	11.00 to 11.50
No. 1 cast, Cincinnati	10.25 to 10.75
No. 1 cast, St. Louis	10.50 to 11.00

IRON AND STEEL PRICES

Corrected up to Tuesday noon

No. 1 cast, Birmingham	9.00 to 9.50
No. 1 busheling, Chicago	8.00 to 8.25
No. 1 busheling, Pittsburgh	9.75 to 10.25
No. 1 busheling, Cleveland	9.50 to 10.00
No. 1 busheling, Buffalo	8.50 to 9.00
No. 1 busheling, Cincinnati	6.50 to 7.00
No. 1 busheling, St. Louis	8.00 to 8.50
No. 2 busheling, Chicago	6.25 to 6.75
No. 2 busheling, Buffalo	6.25 to 6.75
No. 1 boiler plate, cut, Chgo	7.25 to 7.75
No. 1 boiler plate, cut, Buffalo	10.00 to 10.50
No. 1 boiler plate, cut, St. L.	6.50 to 7.00
Boiler plate, Cleveland	8.50 to 9.00
Boiler punchings, Chicago	9.75 to 10.25
Cast borings, Chicago	5.00 to 5.25
Cast borings, Pittsburgh	8.00 to 8.50
Cast borings, Philadelphia	8.25 to 8.75
Cast borings, New York	5.75 to 6.25
Cast borings, Cleveland	6.50 to 7.00
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Cincinnati	4.25 to 4.75
Cast borings, St. Louis	4.50 to 5.00
Machine shop turnings, Chgo	5.00 to 5.50
Mch. shop turnings, Pbgh	7.50 to 8.00
Machine shop turnings, Phila	8.00 to 8.50
Machine shop turnings, N. Y.	5.75 to 6.25
Machine shop turnings, Cleve.	6.00 to 6.25
Machine shop turnings, Buffalo	5.75 to 6.25
Machine shop turnings, Cinci	4.75 to 5.25
Machine shop turnings, St. L.	5.00 to 5.50
Malleable, agricultural, Chgo	8.50 to 9.00
Mall., agricultural, Cleveland	8.00 to 8.50
Malleable, agricultural, St. Louis	8.00 to 8.50
Malleable, railroad, Chicago	9.75 to 10.25
Malleable, railroad, Pittsburgh	9.75 to 10.25
Malleable, railroad, Philadelphia	9.00 to 9.50
Malleable, railroad, Cleveland	10.00 to 10.50
Malleable, railroad, Cincinnati	7.00 to 7.50
Malleable, railroad, St. Louis	8.50 to 9.00
Malleable, railroad, Buffalo	9.75 to 10.25
Angle bars, iron, Chgo	12.00 to 12.50
Angle bars, iron, St. Louis	10.50 to 11.00
Angle bars, steel, Chgo	8.75 to 9.25
Angle bars, steel, St. Louis	9.50 to 10.00
Stove plate, Chicago	9.50 to 10.00
Stove plate, Pittsburgh	8.50 to 9.00
Stove plate, Philadelphia	9.25 to 9.75
Stove plate, Cleveland	8.50 to 9.00
Stove plate, Buffalo	9.75 to 10.00
Stove plate, Cincinnati	7.25 to 7.75
Stove plate, Birmingham	7.00 to 7.50
Stove plate, St. Louis	8.00 to 8.50
Stove plate, New York	7.00 to 7.50
Bundled sheet, Pittsburgh	8.50 to 9.00
Bundled sheet, Cleveland	6.75 to 7.25
Bundled sheet, Cincinnati	5.00 to 5.50
Bundled sheet, Buffalo	5.50 to 6.00
Wrought iron pil'g plates, Clev.	13.00
Grate bars, Buffalo	8.50 to 9.00
Grate bars, New York	6.25 to 6.75
No. 1 country wrght, B'm'gh'm	9.00 to 9.50
No. 2 country, wrght, B'm'gh'm	7.50 to 8.00

(Gross Tons.)

Heavy melting steel, Pittsburgh	$12.25 to 12.50
Heavy melting steel, Buffalo	10.50 to 11.00
Heavy melting steel, Chicago	10.00 to 10.50
Heavy melting steel, Cleveland	10.75 to 11.50
Heavy melting steel, Cincinnati	9.25 to 9.75
Heavy melting steel, Philadel	11.50 to 12.00
Heavy melt'g steel, N. J. points	9.00 to 9.25
Heavy melting steel, St. Louis	11.00 to 11.50
Shoveling steel, Chicago	9.00 to 9.50
Shoveling steel, St. Louis	9.00 to 9.50
Reroll'g rails, 5 ft. and ov., Pbgh	13.50 to 14.00
Reroll. rails, 5 ft. and ov., Chgo	11.25 to 11.75
Reroll. rails, 5 ft. and ov., Cleve	13.00 to 13.50
Reroll. rails, 5 ft. and ov., Phil	13.50 to 14.00
Reroll. rails, 5 ft. and ov., St. L	12.50 to 13.00
Steel rails, short, Pittsburgh	13.00 to 13.50
Steel rails, short, Chicago	10.50 to 11.00
Steel rails, short, Cleveland	12.50 to 13.00
Steel rails, short, Philadelphia	13.00 to 13.50
Steel rails, short, St. Louis	11.50 to 12.00
Iron rails, Pittsburgh	13.50 to 14.00
Iron rails, Cleveland	13.00 to 13.50
Iron rails, Cincinnati	11.00 to 11.50
Iron rails, Philadelphia	15.00 to 16.00
Iron rails, St. Louis	12.00 to 12.25

Frogs, switches, guards, Chgo	9.75 to 10.25
Frogs, switches and g'rds, St. L.	11.50 to 12.00
Car wheels, Pittsburgh	12.75 to 13.25
Car wheels, Chicago	11.75 to 12.25
Car wheels, Birmingham	12.00 to 12.50
Car wheels, Philadelphia	13.00 to 13.50
Car wheels, Buffalo	12.00 to 12.50
Car wheels, N. J. points	12.00 to 12.50
Car wheels, St. Louis	11.25 to 11.75
Iron axles, Pittsburgh	23.00 to 23.50
Iron axles, Cincinnati	19.25 to 20.00
Iron axles, Philadelphia	22.00 to 23.00
Iron axles, Buffalo	22.50 to 23.00
Iron axles, Chicago	19.25 to 20.00
Low phosphorus steel, Buffalo	15.00 to 15.50
Low phosphorus steel, Pbgh	15.00 to 15.50
Low phosphorus steel, Philadel.	16.00 to 16.50

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.75c to 1.90c
Steel bars, Philadelphia	1.80c
Steel bars, New York	1.90c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.85c
Iron bars, Cincinnati	1.70c to 1.80c
Iron bars, Philadelphia	1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.85c to 2.00c
Shapes and plates, Philadelphia	1.80c
Shapes and plates, New York	1.95c
No. 10 blue ann. sheets, Chgo	1.95c
No. 10 blue ann. sheets, Cleve.	2.15c
No. 10 blue ann. sheets, Cinci	2.00c to 2.05c
No. 28 black sheets, Chgo	2.55c
No. 28 black sheets, Cleveland	2.60c
No. 28 black sheets, Cincinnati	2.50c to 2.55c
No. 28 galv. sheets, Chgo	3.60c
No. 28 galv. sheets, Cleveland	3.60c
No. 28 galv. sheets, Cincinnati	3.50c to 3.55c

New Trade Publications

SHOVELS. — The Conneaut Shovel Co., Conneaut, O., has issued a catalog describing its line of hand shovels.

PYROMETERS.—The Stupakoff Laboratories, Pittsburgh, have issued an attractive pamphlet devoted to pyrometers and galvanometers under the title of "Pyrometer Facts". The booklet contains information of value to pyrometer users.

DRILLS. — The Independent Pneumatic Tool Co., Chicago, has issued a circular describing and illustrating roller bearing piston air drills, wood boring machines, single valve chipping hammer, one-piece riveting hammer and two sizes of electric drills.

TRAVELING CRANES.—A 64-page catalog devoted to its extensive line of electric traveling cranes, hand cranes, hoists and other handling machinery, has been issued by the Northern Engineering Works, Detroit. In addition to the detailed views of the various parts of these cranes, hoists, etc., numerous service views are included, showing the application of these cranes in various industrial plants, such as foundries, machine shops, railroad repair shops, steel plants, wire mills, etc.

ELECTRICAL DRILLS, GRINDERS AND REAMERS.—A 32-page catalog issued by the Cincinnati Electrical Tool Co., Cincinnati, is devoted to this company's extensive line of portable electric drills, grinders and reamers. All of the tools are illustrated and detailed descriptions are included covering their construction and use. Portable electrical tool post grinders also are shown, as well as bench grinders, floor grinders, etc. A special bulletin devoted to reamers up to 1¼ inches in capacity also is being sent to the trade.

TURBINES.—An eight-page bulletin issued by the Terry Steam Turbine Co., Hartford, Conn., is devoted to this company's new type of return flow machine. This type is particularly well adapted for low and mixed pressure work, only one rotor being required for the high-pressure velocity stage element. The low pressure elements are in a removable drum which is sectionalized into small, removable pieces that carry the stationary blades. Various views of this machine are contained in this bulletin and details of its construction are included.

GAS PRODUCERS.—In a well-illustrated, 28-page catalog the Smith Gas Power Co., Lexington, O., illustrates and describes its producers for bituminous coal. Tar extractors and gas cleaning plants also are illustrated and described, as well as several notable installations recently made. The Smith recording gas calorimeter also is shown, which is an instrument designed to record the heating value of gas in B. T. U.'s per cubic foot. By the use of this instrument the producer operator may determine what method of operation gives best results and which fuels are most effective.

LOCOMOTIVE CRANES.—An exceedingly handsome, well-arranged and well-illustrated 72-page catalog, printed in two colors, devoted to locomotive cranes, has been issued by the Browning Co., Cleveland. The crane is described in detail in the first section of the catalog and this is followed by a magnificent pictorial display of these cranes in use at blast furnace plants, ore docks, steel mills, foundries, etc. The adaptability of this type of crane covers an exceedingly wide range and their territorial spread of application extends from the iron ore mines in the Lake Superior region to the ditch of the Panama canal.

BORING AND DRILLING. — "Difficult Drilling and Boring Made Easy" is the title of a handsomely illustrated and well-arranged 30-page booklet issued by the Pawling & Harnischfeger Co., Milwaukee, which is devoted to the work that is being done in various plants throughout the country on the horizontal drilling and boring machines built by the Pawling & Harnischfeger Co. Following a detailed description of these machines, service views are included showing the various lines of work to which this type of machine is adapted. These views were made in various plants in which these machines are installed and clearly indicate the wide field of application for this tool.

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Coke Oven Gas for Gas Engines

(*Continued from page* 473.)

tempt was made to cure the trouble by resorting to building materials which would not be attacked by sulphuric acid. The author remembers that the first single-acting coke oven gas engine designed by him in 1901 was equipped with gas cylinder liners and exhaust valves made of a special phosphor bronze.

Corroded Exhaust Pipes

The corroding influence of sulphuric acid formed by sulphur in the gas in the presence of water can often be seen on the exhaust piping whenever water has to be injected to muffle the noise of the exhaust. In several plants abroad aluminum exhaust pipes which are not attacked by acids were tried with very good success, but the prohibitive cost of the material makes its extensive use impracticable. Cast iron pipes and mufflers with a 2-inch coating of concrete or lead-lined pipes are used in several plants and in a few exceptional cases the short cast iron pipe connections between exhaust chambers and mufflers are simply replaced every second or third year. Considerable progress has been made in recent years in designing sulphur cleaning plants which eliminate nearly all of the sulphuretted hydrogen, although no practical means has so far been discovered to separate carbon bisulphide from the gas.

Coke oven gas engines are now used abroad to no small extent, but their application has so far been more or less limited to the generation of electric power. The application of the coke oven gas engine for direct driving of rolling mills is to the author's knowledge not illustrated by a single installation abroad or in this country. No inherent difficulty peculiar to the coke oven gas engine is responsible for this condition; in fact, many considerations point clearly to the advisability of its use for this purpose. Its absence from this field is largely explained by the geographical separation of coke oven plants and rolling mills.

Rolling Mill Gas Engines

The load conditions of rod, wire and sheet mills are not unfavorable for direct gas engine drives, since they impose upon the prime mover, neither violent nor excessive load variations. The average power demand of such mills is moderate, so that frequently single tandem gas engine units are fully capable of performing the work. The rope wheel, which usually drives a number of stands, is necessarily of large diameter and can easily be given sufficient weight to provide for ample flywheel effect. Uniformity of rotation is thus insured and it is not difficult to obtain a perfectly uniform product. The direct-connected rolling mill gas engine for light continuous mills does not require much overload capacity, and can, therefore, be suitably rated to operate at a high load factor. The gas consumption is then very low and the thermal efficiency high. The result is a substantial fuel economy per ton of finished product, compared with steam engine, steam turbine, or electric motor drives.

The principal advantage of direct gas engine mill drives is, of course, the saving in cost of installation and operation. Such direct drives do away with costly combination of electric central station, transformers, transmission lines, mill motors, and the requisite expensive auxiliaries. Blast furnace gas engines are used for light rolling mill purposes in a number of steel plants abroad and they have proved the adaptability and serviceableness of the gas engine for driving direct-connected roll trains in years of satisfactory service.

No matter what objections could justly or unjustly be raised against the use of coke oven gas for direct power

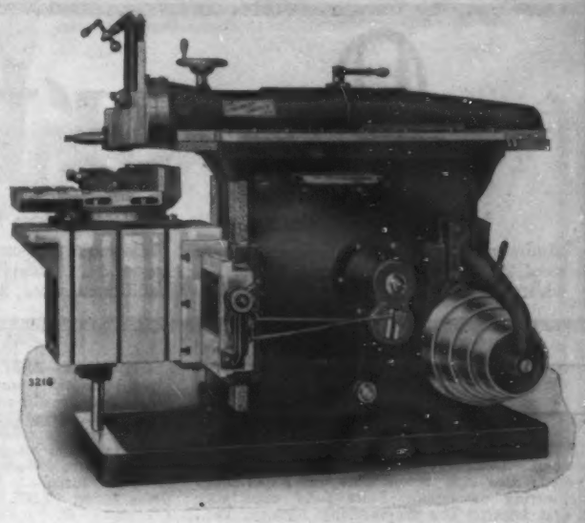
generation in modern gas engines, none of these can apply on the use of a mixture of blast furnace and coke oven gas. The practice of combining blast furnaces, steel mills, and coke oven plants in one locality, gives the American iron and steel master an enormous advantage over the majority of his European competitors in the matter of rational utilization of the available surplus gases. It is evident what truly ideal conditions would obtain in such combined plants if only one kind of gas fuel were used for all requirements of the plant. A gas mixture in suitable proportions of blast furnace and coke oven gas would fulfill the most exacting specifications which could be imposed. It could be used to heat the blast for the blast furnaces, to operate blast furnace and Bessemer gas-blowing engines, to produce electricity in gas-electric central stations, to run the pumping plant, to serve as bench fuel at the coke ovens, to heat the pig iron mixers, to produce steel in open-hearth furnaces, to heat the ingots in the soaking pits, and the steel in the reheating furnaces, to drive gas engines direct connected to certain roll trains, to supply the needs of the foundry, and, finally, to raise steam in boilers.

The Proper Gas Mixture

There would not be any difficulty in maintaining a heating value of the gas mixture to all intents and purposes uniform, if this task were committed to the action of automatic devices. One, or if necessary, several automatic recording gas calorimeters could be equipped with a maximum-minimum electric contact attachment, corresponding to the permissible maximum and minimum heating value of the gas mixture. These calorimeters would control, by means of relays and electric motors, gate or butterfly valves, arranged in the coke oven gas pipe at, or near, the point of connection with the blast furnace gas main. Owing to simple butterfly valve gear regulation, variations of considerable magnitude in the heating value of the gas mixture are apparently without detrimental effect upon the operation of the engines. A mixture of one part of coke oven gas of 500 B. T. U. and of 15 parts of blast furnace gas of 100 B. T. U. would have a heating value of 125 B. T. U. per cubic foot.

Whatever the capacity of the gas engine plant is, both gas-blowing and electric engines should be equipped with exhaust heat boilers. Steam of any desired gage pressure can be generated in such boilers at very small cost, and over 50 per cent of the heat ordinarily rejected in the exhaust can be recovered. The steam can be utilized in many ways: For heating purposes, for operating steam turbo-generators, or for blowing gas producers, especially if by-product recovery gas producers are installed in connection with the coke oven plant. Practical experience in a number of European gas power plants shows that about 1.8 pounds of steam of 150 pounds gage pressure can be raised in this manner for each brake-horsepower developed in gas engines operating at full load. This quantity increases to about two pounds per brake-horsepower if the gas engines operate at approximately half load. It can be shown that the requirements of about 1.5 pounds of steam per pound of coal gasified in the by-product recovery gas producer plant are fully covered by the amount of steam raised by exhaust heat boilers in the gas engine station.

An eight-page pamphlet, devoted to door safety switches for use in electric elevators, recently has been published by the Cutler-Hammer Mfg. Co., Milwaukee. It is claimed that the majority of accidents on all types of elevators result from setting the machine in motion before the doors are closed and locked.



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Position Wanted Rates
Minimum, 25 words, 50c. Each additional word, 2c. All capitals, 25 words, 75c. Each additional word, 3c.

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Minimum, 25 words, $1.00, Each additional word 4c. All capitals, 25 words $2.00. Each additional word, 8c.

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WANTED A REAL LIVE SALESMAN acquainted with sand blast machinery, sand blasting, tumbling mills, core ovens and general foundry equipment. We want a man to represent us in the eastern states, his headquarters to be in New York City. Address Box 990, THE IRON TRADE REVIEW, Cleveland, O.

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